The Chemical Age

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Notes and Comments

A Fine Object

FEW if any presidential addresses presented to the Society of Chemical Industry in the fifty-one years of its existence have been more provocative of discussion than that which Professor G. T. Morgan delivered at Nottingham last week, and it would have been all to the good if time and circumstance had made it possible for the members to participate in an open debate on the points raised in the address. Viewed purely as an attempt to focus attention upon what might be done for the ultimate benefit of the chemical industry and profession, the address was an achievement of no mean order and deserved more than the passing applause which it received. As Lord Trent remarked at the annual dinner later in the week, there must be a limit to the number of societies to which those who are struggling to meet increased income tax, often on reduced incomes, can subscribe, and in aiming at a measure of unification, Professor Morgan is setting up a very fine object. Lord Trent was speaking from the ordinary business man's point of view, as a member of the general public and as a director of a company, and he heartily supported the president's plea. In these difficult days, the business man is naturally looking round for economies, and it does not appeal to him to subscribe to perhaps two, three or four societies which, so far as he can see, are all striving for the same end.

It will probably take much more than the five or ten years mentioned by Lord Trent to bring about the complete fulfilment of Professor Morgan's ideals, but there is no reason why, in the meantime, all who are engaged in the pursuit of chemical science and engineering should not cultivate the habit of thinking not quite so much for themselves alone but rather more for the good of the profession and the industry they serve, irrespective of whether any of the 14 or 16 societies cited by Professor Morgan in his address, stands to gain or lose by a broadening of their professional outlook.

Prospects of Re-union

ALTHOUGH during the last few years there has been considerable correspondence on the subject of amalgamation and reunion of the existing chemical associations, and although this matter forms a topic for many after-dinner speeches at social gatherings, it is to Professor Morgan's mind doubtful whether any really effective step in this direction has so far been taken, apart from two laudable examples of collaboration in publication. Reviewing the 14 societies whose finances and membership were analysed in his address, and also several others, he finds it difficult to conceive of one or more of them repeating the fine self-denying gesture of the Newcastle Chemical Society which, although an older organisation, decided to throw in its lot with the new Society of Chemical Industry in 1882. His doubt arises not from the absence of enthusiasts for reunion, but because so many of these reformers think mainly in terms of their own favourite society, as in the olden days when those stout warriors, Oswald, Penda, Offa and Egbert were each of them fervent to the point of truculence for his own particular patch of the Anglo-Saxon Heptarchy. It is easy to be wise after the event, but looking back across the ages one may now perceive that excessive zeal on behalf of Greater Wessex, Pan-Mercia, or Northumbria Irredenta was not the most effective way of bringing about a united England. Those who think with Professor Morgan that some measure of coalescence and simplification would be beneficial to British chemistry have many dissentients to convince and much apathy to overcome. Numerous experienced members of the profession maintain firmly that the present arrangements are as good as any we are likely to get; that an increase in specialist societies is inevitable and in fact desirable, since these smaller bodies arouse among their adherents a greater fervour and enthusiasm than is noticeable in the larger societies. It is always pleasant and stimulating for a small group of experts to foregather and talk shop on their own special subject. But it is only in the more populous centres that such gatherings are readily brought about. In smaller towns the expert is remote and isolated from his professional kindred. The Society's new constitution with its network of subject groups and local sections would appear to offer a reasonable compromise.

The Chief Danger

OUR own attitude towards a unification of professional interests within the chemical industry is one of whole-hearted enthusiasm for any movement which will make for the greatest good for the greatest number. We are amazed, as all impartial observers must be, to find that of the thousands of pounds subscribed annually by the " stage army " of 23,605 members of some 14 or 15 kindred societies, 55 per cent. is spent on benevolent supervision and official administration, while only 23.5 per cent. goes to scientific literature, 6.5 per cent. to social amenities and 6 per cent. to library facilities. An enormous sum of money is wasted on the chemical " civil service " which should be devoted to furthering the highest interests of the profession, and the waste can only be liminated by amalgamation of societies. The chemical industry—

and particularly the professional side of it—must, however, be on its guard against one real danger—the danger of being dominated by a single organisation which may, or may not, at all times have the best interests of the industry as its first concern.

Each of the existing societies professes to seek the highest ideals of the industry at large, and immediately hedges itself round with all sorts of absurd and irritating little restrictions, one of the most unreasonable of which is that relating to publicity. Many of the societies, both large and small, have a periodical of their own, ranging from a weekly journal which professes to be the " official organ " of this, that and the other organisation, to the monthly or quarterly " Transactions," containing, either in full or in abstract, the principal papers presented during the period covered by the publication. Now and again we hear of a big publicity push on the part of one or other of the societies, which succeeds in getting a mention in the daily Press. Between the limits of the association journal and the daily Press, however, there is already a vast " No Man's Land " in which the independent technical journal, which happens to be unfettered by any ties with professional bodies, is denied that freedom which we would venture to claim as a right. " We must not let the Press publish this until it has appeared in our own transactions, otherwise our members will be denied that ' plus a little something other people do not get ' to which their subscriptions entitle them " is a plea that is far too often heard in chemical circles to-day. It has been said that an industry, like a people, gets the Press it deserves, but that it is not strictly true where unreasonable and unnatural restrictions are imposed, and we can perceive a real danger in this connection if the number of societies is too drastically curtailed. Publicity is either helpful or harmful. With so many individual efforts to promote publicity we cannot but believe that the chemical industry is properly mindful of its advantages but it must be watchful lest a closing up of the ranks and a consequent development of bureaucracy tends to stem the tide of publicity which now flows more or less freely through independent channels, and which probably serves the interests of the industry to a greater extent and over a wider field than would be possible within the restricted sphere of the official sheet issud by the " chemical civil service," no matter how excellent its civil servants may be

Forty Years of Stereo-Chemistry

Sir William Pope, in his Messel memorial lecture, at the annual meeting of the Society of Chemical Industry at University College, Nottingham, on July 14, gave an interesting account of the history of the changing views regarding the shapes of the molecules of which organic substances are composed. He related how the original theory regarding the asymmetrical disposition of atoms around a carbon atom in a molecule had been found to apply to other elements, such as silicon, phosphorus and tin. This lent evidence to supplant the idea that the chemical molecule is spread out in three-dimensional space, and every chemist to-day tries to picture to himself the manner in which the component atoms of chemical molecules are arranged in space and to ascertain how the properties of compounds are influenced by the shape of the molecules. How different substances may contain the same proportion of elements, by analysis although their properties may be dissimilar, is thus explained. By this means many of the problems which have confronted chemists since the time of Pasteur have been solved. The rapid expansion of modern physics during recent years has provided novel and powerful methods for determining the arrangement of the atom and of the components of the atom. Such novel methods include the use of X-rays, with which Sir William dealt in his lecture.

It was appropriate that Professor H. E. Armstrong, the doyen of the chemical profession, the first Messel medallist and the professor to whom Sir William Pope owed much of his early training, should have been chosen to propose the vote of thanks to Sir William for his Messel memorial lecture. It gave him the opportunity not only to express his appreciation of what had been achieved but to indicate further work that ought to have been done. Professor Armstrong also seized the chance of putting in a word for professional unification in the chemical industry. He begged Sir William Pope to throw chemistry aside, to take on the chemists and to give his best attention to the unification of the profession which to his mind was as unprepared with a " policy " as was the world at large. We agree with the Professor that the profession needs all the experience it can obtain to put it straight and men such as Sir William, with wide experience, are the men to help.

Commercial Education

About 500 delegates from 37 countries will attend the fifth triennial congress of the International Society for Commercial Education—the first to be held in England—which will be held in London next week. In addition to many delegates from Britain and the British Dominions, practically every country in Europe, Persia, India, China, Japan, the United States, and the South American Republics will be represented. Among the patrons and supporters of the congress are the Prince of Wales, almost all the Ambassadors at the Court of St. James's, the Lord Chancellor, past and present Presidents and Parliamentary Secrtaries of the Board of Education, the President of the Board of Trade, the High Commissioners for the Dominions, the Chancellors and Vice-Chancellors of the Universities, including the Earl of Athlone (London), Lord Grey of Falloden (Oxford), and Mr. Baldwin (Cambridge and St. Andrews), and the heads of the leading municipalities, chambers of commerce, and private firms. The subjects for discussion at the congress were set out in The Chemical Age of May 7. The opening meeting will be held in the Hall of the Grocers' Company on Monday, July 25, when the Lord Mayor of London (Sir Maurice Jenks) will preside, and speeches of welcome will be delivered by the president of the congress, Sir David Milne-Watson; Mr. Ch. E. H. Boissevain, president of the International Society for Commercial Education; and Sir Francis Goodenough, chairman of the British Association for Commercial Education, which is organising the congress. The Prince of Wales, who is showing a close interest in the congress, will address the delegates at the close of the final sitting on Friday, July 29.

Annual Meeting of the Society of Chemical Industry

Presentation of the Messel Medal: The Annual Dinner

THE fifty-first annual meeting of the Society of Chemical Industry—the opening stages of which were reported in THE CHEMICAL AGE last week—was continued at the University College, Nottingham, on July 14, when Professor G. T. Morgan, the retiring president, presented the Messel Medal to Sir William Pope, who afterwards delivered his Messel Memorial Lecture on "Forty Years of Stereo-chemistry." The annual dinner was held at the Mikado Restaurant, Nottingham, in the evening, and the following day was devoted to a series of visits to works and places of interest in and around the city.

ON the motion of the PRESIDENT, a hearty vote of thanks was accorded the local committee at Nottingham for the excellent arrangements made for the comfort, instruction and entertainment of the members.

The PRESIDENT, in presenting the Messel Medal to Sir William Pope, said that the thoughts of the members turned naturally to their benefactor, the late Dr. Rudolph Messel, who was born in 1874 and died in 1920. His career in this country had begun in 1878, when he had become managing director of the firm ultimately known as Spencer, Chapman and Messel, Ltd., sulphuric acid manufacturers of leading importance at that time. Although Dr. Messel's work was predominantly in the industrial sphere, he was always a very accurate scientific chemist. He was hon. foreign secretary of the Society for about ten years, beginning in 1910; he was president in 1911-12, and in 1914, and presided over the eventful annual meeting at Nottingham in the latter year. He had left the bulk of his fortune to the Royal Society and the Society of Chemical Industry, the latter body having participated to the extent of about £20,000. It was characteristic of the donor that he had left this handsome bequest practically free from all restriction, for the Society's use in the furtherance of its objects. The value of the original investments was £18,435, and that had grown to something of the order of £30,000, although this latter sum was subject to some readjustment which might arise as the result of the War Loan Conversion scheme.

In 1921 it was decided to preserve the memory of the donor by presenting a special medal, struck in gold, once every two years to the author of the Messel Memorial Lecture. The recipient of the medal was to be a person who had distinguished himself in science, literature or public affairs. The first Messel medal was presented in 1922, at the annual meeting in Glasgow, to Professor H. E. Armstrong, and subsequent recipients of the medal were Viscount Leverhulme (Liverpool, 1924), Earl Balfour (London, 1926), Dr. Robert A. Milliken, of California (New York, 1928), and Lord Brotherton of Wakefield (Birmingham, 1930).

Sir William Pope's Work

This year the Council had decided unanimously to award the Messel Medal to Sir William Pope. Sir William was endowed in abundance with all the statutory distinctions in science, literature and public affairs. In addition, he possessed two other relevant attributes; he was a personal friend of the late Dr. Messel, and, moreover, he was the most distinguished pupil of the first Messel medallist, Professor H. E. Armstrong. His work was so well known to all chemists that, fortunately, it was not necessary to indicate even a selection of the outstanding discoveries which had placed him in the forefront of chemists having an international reputation. His researches had covered a wide field, including chemistry in all its branches, crystallography and photography. His early investigations in chemical crystallography had led him to pay special attention to the special arrangement of atoms in chemical molecules, and 33 years ago, in collaboration with Mr. Peachey, he had first shown that the grouping of chemical radicals round a nitrogen atom could be detected by the optical activity of certain complex ammonium salts. Up to that time these stereo-chemical relationships had been investigated only in relation to carbon atoms.

This, his first epoch-making discovery, was soon followed by many others, all tending to show that optical activity could be manifested in regard to the arrangement of groups round many elementary atoms other than carbon. Sir William's work had established a well-defined British sphere of influence in this new field of stereo-chemistry.

His success as a chemist had brought him many well-deserved honours. He was a Davy medallist of the Royal Society, president of the Chemical Society from 1917 to 1919, and was its Longstaff medallist in 1903. Foreign academies and learned societies had showered distinctions upon him. He was Dumas medallist of the Société de Chimie Industrielle and honorary member of the French Chemical Society. Now it was the turn of the Society of Chemical Industry, of which he was president eleven years ago. The Messel Medal was the highest distinction they could offer him, and they wished him most heartily the best of health and strength to continue the distinguished career of which they as British chemists were all so justly proud.

Sir WILLIAM POPE, responding, said the Society of Chemical Industry had done him a great honour in awarding him the Messel Medal, and it would be affectation on his part to say that he was not deeply moved by that award. There were several circumstances which made it peculiarly gratifying to him. First of all, he was one of those who had known Dr. Messel quite well, and everyone who had known him could not fail to remember with affection so charming and hospitable a personality.

Secondly, he (Sir William) and the president were students together many years ago, and he was quite sure that at that rather distant date neither of them had had any notion that they would meet on the same platform to-day, one as president of the Society and the other as the recipient of the Messel Medal. Thirdly, among the members of the Society he numbered a great many personal friends, some of whom were present on this occasion, so that the award was not an ordinary award from a society or body of which one knew nothing, but it was one made by a body consisting of his own personal friends. He expressed thanks for the kind remarks which had been made with regard to his work, and for the happy manner in which the medal had been presented.

Sir WILLIAM POPE then delivered his lecture, which is reported in pages 73-75.

The Annual Dinner

The annual dinner was held at the Mikado Restaurant, Nottingham, on Thursday, July 14, Professor G. T. Morgan being in the chair.

Lord TRENT proposed the toast of "The Society of Chemical Industry," and emphasised the fact, which had impressed him when reading the annual report, that the past year was the first in its 51 years' existence in which apparently a consistent effort had been made for publicity on behalf of the Society as a whole. He had read the paragraph dealing with that matter with a great deal of interest because however good a cause, it was of no use in these days hiding one's light under a bushel. During the lifetime of the Society entirely new industries had arisen, such as artificial silk, built up through the discoveries of scientists and chemists. Further, Professor C. E. Inglis, of Cambridge University, after opening the new technical college building at Lincoln had predicted that the age of steel and iron was finished, and that some entirely new industry would be built up to replace iron and steel. One could imagine that that was not very cheerful news for the men working in the iron industry at Scunthorpe, but to close their eyes to these possibilities would not help so much as making up their minds that they were going to be absolutely abreast of development and that they were going to do all they could to keep in line with anything new that came along.

He did not suppose there was any one society in the country whose work touched the life of the man in the street at so many points as did the work of the Society of Chemical Industry, and those who had been privileged to hear or to read the speech made by Sir Harry McGowan at the Society's jubilee meeting in 1931 must have been impressed by the figures and facts given therein concerning the Society and chemical industry generally. There was no doubt that during the 51 years of the Society's existence there had never

been a time more critical for this country than the past 12 months—and he did not except even the war period. We were by no means out of the wood yet, and if this country was to make headway we must make every use we possibly could of the discoveries and inventions of scientists and chemists such as constituted the membership of the Society.

A Plea for Amalgamation

In this connection Lord Trent emphasised, from the ordinary business man's point of view, the appeal made by the president for the amalgamation of the various kindred societies. He was speaking as a member of the general public, who was also a director of a company. In these times one was naturally looking round for economies, and it did not appeal to any business man to subscribe to perhaps two or three or four societies which, so far as he could see, probably due to his own ignorance—were all striving for the same end. He would rather pay three guineas to one society than 30s. or two guineas to each of three or four societies. For those who were struggling to meet increased income tax, and on reduced incomes, there must be a limit to the number of societies to which they could subscribe, and therefore he gave his support to the president's plea. It might take five or ten years to achieve the object in view, but it was a very fine object.

The PRESIDENT, replying, said that it was always a privilege to be in the position of responding to the toast to the Society—the liveliest association of chemists in this country. With regard to his plea for unification of chemical associations, he expressed his pleasure that already he had made one convert in Lord Trent. It must be a strain, whether one was a director of a company or just a humble employee, to find every year the 12 or 14 subscriptions which some of them had to find. A most favourable announcement had been made recently by the secretary of the Society of Food Industry, which was about to be formed. The secretary of that body had met the overtures of the Society of Chemical Industry with great cordiality, and had written to Dr. L. H. Lampitt (chairman of the Society's Food Group), to the effect that in the next issue of the official organ of the Society of Food Industry he and his committee would recommend the fusion of that Society with the Food Group of the Society of Chemical Industry. That was a step in the right direction. At any rate it would prevent the formation of a new body, and the president expressed the hope that before long the Society of Chemical Industry would have more opportunities such as it had had at Newcastle some years ago of taking other societies into its organisation. They were all working in different sections of chemical science, but why should not they all belong to one society? They wanted to react not as analytical or physical or biological chemists but as "chemical" chemists, and to achieve that purpose they did not think that more than one society was required.

Distinguished Visitors

Dr. HERBERT LEVINSTEIN, past-president, in his characteristically humorous manner, proposed the toast of "The Guests." He made particular reference to Lord Trent, to whom the Society owed so much, and who had been a most gracious host. One could not forget that he occupied the not undistinguished post of vice-president of the Society and one hoped that it gave him as much gratification as it gave pleasure to other officers of the Society to count him as a colleague. Others to whom special reference was made were the Lord Mayor and Lady Mayoress, Principal Hugh Stewart (University College), the Town Clerk of Nottingham, the Lady Sheriff, the ladies, and the representatives of kindred bodies, these latter including Dr. G. C. Clayton (Chemical Society), Mr. J. Stenhouse (president of the Institute of Brewing), Mr. F. Gladstone Hines (president of the Pharmaceutical Society), and Mr. C. C. Last (chairman of the Institute of Plastics). He also paid a tribute to Professor H. E. Armstrong, a father and grandfather of chemists, the G.O.M. of chemistry, of whom all chemists were proud. He was a man of action and enterprise, one who never damned anybody with faint praise nor praised anybody with faints damns.

The LORD MAYOR, in responding, referred to the developments that were being made in Nottingham in connection with housing, education, health and other public services, with a view to making Nottingham one of the finest cities in the kingdom, and he paid a tribute to the city's officials.

Principal HUGH STEWART (University College, Nottingham), expressed very wittily the thanks of the guests to the Society for the hospitality it had extended to them. In this connection he referred to an occasion when Dr. Samuel Johnson was speaking to his townsman, David Garrick, who had wished to smile with the simple and feed with the poor. Dr. Johnson had replied that he would rather smile with the wise and feed with the rich. In future, said Principal Stewart, the Society's guests would look back upon this occasion as one on which they had smiled with the wise and fed with the rich.

Professor Armstrong's Reminiscences

Professor H. E. ARMSTRONG, F.R.S., who proposed "The President," claimed association with the Midlands in his earlier days—with Stoke-on-Trent, Burton-on-Trent, and from about 1880 with Nottingham. He recalled the days when Nottingham began to teach science entirely "on the rates." The first Professor of Chemistry there was his fellow student, Frank Clowes, and the second was his valued assistant, Professor Kipping. Amid considerable laughter Professor Armstrong claimed also that he had given Nottingham some good advice. He recalled that many years ago he visited Nottingham to lecture on low temperature carbonisation—a subject from which he had derived a lot of fun but no money. Very early in his address he criticised severely the heating and lighting policy pursued by the authorities there, and moved that the whole meeting should go down to the Town Hall and hang the town clerk and perhaps one or two of his chief assistants on the nearest lamp-post. He was now enjoying a pleasant evening, at this 51st annual dinner of the Society, sitting next to a gentleman whom he believed was spared on that earlier occasion, when he raised a little storm and got the local Section into some difficulty. He had received thanks through the Press from a number of people for having done in an evening what they had been trying to do for years. He had now learned from the Town Clerk that recently Nottingham had spent a couple of million pounds on electricity.

With regard to finance, Professor Armstrong referred to a paper he presented some little time ago, in which the suggestion was made that members of the Society might contribute, say, 1s. per week from their cigarette money to a fund. That suggestion was not pursued, but if it had been adopted there would have been a sum of £50,000 in hand by now, and it would have been of great help. With regard to the unification of chemical societies, he suggested that a committee consisting of half a dozen intelligent people—if we had them—might be appointed and set to work to produce a scheme for bringing those societies together. Until we did that we should not make progress.

Appalling Public Intelligence

He had been working at education for 60 years, he continued, but he considered that the present state of public intelligence was perfectly appalling. He referred to the waste that had occurred during those 60 years by failing to teach people to be intelligent on their own behalf. Intelligence had been developed towards technical work such as one saw at Boots' factory, but not towards public work. Reference had been made by the Lord Mayor to the great improvements in housing and education, but he would ask the Lord Mayor to consider what had been the result of education before he asked for much more. Far more important than either housing or education was the question of proper feeding, and we had not understood that matter hitherto. The bad condition of the masses, and the low standard which was being attained, was due to improper feeding. We wanted quality rather than quantity, and chemists were showing what quality in food really was. These were matters which chemists were investigating and were going to bring to a head in the course of the next ten or a dozen years. When these matters were attended to properly there would be work for the public authorities to do. The feeding of the country was not being carried out on scientific lines and was undoubtedly improper.

The PRESIDENT, in the course of a humorous response to the toast, said that Professor Armstrong had taken the classical line which was adopted by Sergeant Buzfuz in a classical trial. He had said "Of this man Pickwick I shall say but little; the subject presents but few attractions."

Forty Years of Stereo-Chemistry

By SIR WILLIAM J. POPE, D.Sc., F.R.S.

The following extracts are taken from the sixth Messel Memorial Lecture, delivered by Professor Sir William J. Pope at the annual meeting of the Society of Chemical Industry at Nottingham last week.

DURING his early work, carried out between 1848 and 1860, Pasteur proved conclusively that the optical activity of *d*- and *l*-tartaric acid originates in a dissymetrical or enantomorphous arrangement of the atoms composing the molecule. He showed that although *d*- and *l*-tartaric acid have the same molecular constitution, the configuration in space of the molecule of the one is the mirror-image of the other isomeric acid. He showed also that the synthetic preparation of compounds capable of existing in two-mirror-image isomerides must inevitably lead to the production of the two isomerides in equal quantities, and gave us the three typical kinds of method still used in the resolution of such optically inactive mixtures or racemic compounds into their optically active components. Having constructed the framework of stereo-chemistry with such skill and accuracy, nearly all the more modern work on the subject has consisted in filling in the framework and making it a more complete and imposing edifice.

When giving a summary of his work on the tartaric acids in 1860, Pasteur asked: "Are the atoms composing the dextro-acid arranged along the spiral of a right-handed helix, or placed at the apices of an irregular tetrahedron, or distributed in some other definite dissymmetrical manner?" The reason why he could not reply to these questions lay in the fact that at that date the modern theories of valency and of chemical consitution were yet new and their full purport was not generally grasped, particularly in France. It was left for van't Hoff and LeBel to make the next step in 1874 by introducing the conception of the asymmetrical carbon atom. These two workers pointed out that all known substances which showed optical rotatory power in the liquid or dissolved state contained at least one carbon atom which was attached to four different radicals; if the four different radicals are imagined situated at the apices of a tetrahedron of which the asymmetric carbon atom occupies the centre, two mirror-image configurations should result.

The Tetrahedral Configuration of Methane

The theory of the tetrahedral configuration of methane and of the asymmetric carbon atom deduced therefrom was found sufficient to explain all the cases of optical activity known at the time and until much later. It found its most elegant application at the hands of Emil Fischer in determining the configurations of the sixteen optically active hexoses identical in constitution with glucose. Both Pasteur and LeBel were accomplished crystallographers whilst van't Hoff had also studied crystallography, although to a lesser extent. It is highly probable that if these three workers had not possessed that facility in visualising the symmetrical properties of solid or three-dimensional figures which appertains to the trained crystallographer, they would have been unable to lay the foundations of stereo-chemistry with such certainty.

The statement of the tetrahedral configuration of methane and the enunciation of the doctrine of the asymmetric carbon atom was followed by the application of van't Hoff and LeBel's conceptions by Wislicenus to the explanation of the *cis*- and *trans*-isomerism of ethylene derivatives and by von Baeyer's development of the strained bond theory in connection with polymethylene ring systems. No fundamental expansion in our knowledge of optically active stereo-isomerides, apart from those already mentioned, came, however, for many years. This was due to the fact that little advance in the technique of resolving synthetic mixtures or racemic compounds of optically active substances into their components had been made since the days of Pasteur; the tartaric acids were the only ones used for the resolution of externally compensated bases until the sulphonic acids of camphor and its halogen derivatives were prepared by Kipping and Pope in 1895.

These new and powerful optically active acids were then applied by Peachey and Pope to the resolution of externally compensated bases with obvious advantages, other isomeric sulphonic acids of camphor and its halogen derivatives were prepared by Reychler and by Armstrong and Lowry and we were able to use these for the resolution of bases into their optically active components. Even so feebly basic a compound as racemic camphor-oxime proved resolvable by salt formation with *d*-camphor-β-sulphonic acid.

Many attempts to prepare quaternary ammonium salts which showed optical activity associated with the presence of an asymmetric quinquevalent nitrogen atom had previously been made but without success; LeBel supposed in 1891 that he had obtained such a compound showing a feeble optical activity but it was subsequently shown that this was not correct. The first case of optical activity associated with the presence of an asymmetric nitrogen atom was described by Peachey and myself in 1899; we obtained *d*- and *l*- phenylbenzylmethylallylammonium salts with the aid of *d*-camphor-β-sulphonic acid. This resolution was followed by further work by Smiles, Kipping, Meisenheimer, ourselves and others in which compounds were prepared of which the optical activity was associated with the presence of an asymmetric sulphur, tin, silicon, phosphorus, or selenium atom; the resolution was in each case effected with the aid of one or other of the camphor sulphonic acids.

An Unsolved Problem

The demonstration that optical activity may be associated with the presence in the molecule of asymmetrical atoms of many elements besides those of carbon made us realise to a greater extent than ever before that the chemical molecule is spread out in three-dimensional space; every chemist to-day tries to picture to himself the manner in which the component atoms of chemical molecules are arranged in space and to ascertain the way in which the properties of compounds are influenced by the shape of the molecules. Even very simple compounds may have a stable three-dimensional arrangement of their parts.

Whilst our knowledge of the various branches of stereo-chemistry is still increasing rapidly, one particular problem still remains unsolved in spite of the vast amount of time and effort which has been lavished upon it. This concerns the space configuration of the benzene ring and of aromatic compounds in general. Most stereochemists have attempted the resolution into optically active components of highly substituted derivatives of benzene; the most complex instances chosen for study have been aromatic compounds in which five or six benzene hydrogen atoms are replaced by five different radicals.

In no case has mirror-image isomerism been detected—unless, of course, when substituting radicals containing an asymmetric carbon atom have been inserted. Now, it is very difficult to believe that the benzene system of six carbon atoms in a closed ring attached to six different radicals remains flat and retains a plane of symmetry in which those six carbon atoms are centred; yet no experimental evidence of a positive kind, such as would be furnished by the preparation of an optically active benzene derivative of the type described, has been obtained. It may well be that the benzene system is so mobile and liable to change of configuration that replacement of all six hydrogen atoms by different radicals is necessary to render it stable.

Fields for Closer Investigation

Although active progress is still being made in most of the foregoing branches of stereo-chemistry our knowledg of one particular section of the subject is developing but slowly; this deals with the combination to a homogeneous crystalline compound of substances of mirror-image configuration. Pasteur early showed that racemic acid is a crystalline compound of *d*- and *l*-tartaric acid in equimolecular proportion; whilst the optically active acids crystallise without water, the racemic acid contains water of crystallisation which is readily driven off by heat and is not taken up again on exposure to air saturated with aqueous vapour. On the other hand, the racemic form of spiro-5 : 5-dihydantoin crystallises anhydrous but the optically active components crystallise with water; this water is driven off by heat and the anhydrous material is hygroscopic, absorbing the correct proportion of water from moist air. It may be supposed that in these cases

the racemic compound is of much the same nature as a double salt and that the water of crystallisation plays the part of packing material to fill up interstices in the crystalline structure. This view is in accordance with the fact that, in general, a racemic compound is less soluble than its optically active components and that its formation is accompanied by contraction. There are, however, exceptions to this; thus, the racemic form of mandelic acid has a lower density and a higher solubility than its optically active components. The reason for this is quite unknown and such anomalous cases call urgently for elucidation.

The question of racemic combination between dextro- and lævo-isomerides in the liquid state has also received far too little attention; in certain cases it seems fairly clear that no such combination occurs. Thus, the synthetic tetrahydroquinaldine has the same density and refraction constants as the optically active components; further, the lævo-isomeride has the same rotatory power when dissolved in the inactive mixture as in the pure liquid state, although in other solvents the rotation varies widely. These facts lead to the conclusion that no racemic combination occurs between the mirror-image isomerides in the liquid state. On the other hand Cotton has shown that on mixing aqueous solutions of potassium copper *d* and *l*-tartrates the blue colour of the solutions changes and becomes deeper; this may be due to racemic combination in the liquid state. At the same time the evidence is not conclusive since the composition and molecular weight of the coloured salts are not known.

Vote of Thanks to Sir William Pope

Professor H. E. ARMSTRONG, F.R.S., proposing a vote of thanks to Sir William for his lecture, said it was a matter for congratulation that the presentation of the Messel Medal to his own most distinguished pupil should have been made in the University of Nottingham, and in the presence of the Professor of Chemistry there. Professor Kipping was blushing almost unseen in Edinburgh many years ago, but the faint blush which had reached the south was of such a character that he (Professor Armstrong) had travelled north and had stolen him from Perkin, to Professor Armstrong's great joy and, he believed, to Professor Kipping's profit. There was a character in history known as the "King maker." If the history of chemistry ever came to be written in a careful manner, perhaps two names would go down as "Pope makers." Together they could claim to have made a medallist. Sir William Pope left school at the age of 15 and went to the Finsbury Technical College, where he (Professor Armstrong) introduced engineering into the chemistry course for the first time as a necessary subject of instruction. Two years later he went to the Central Technical College, where, in 1884, Professor Armstrong introduced crystallography into the chemistry course as a necessary element. Those two things together had given him an opportunity which relatively few had had. But opportunities, of course, were of no value unless one was prepared to take them.

Professor Armstrong was proud that in respect of the Messel Medal he had got ahead of Sir William, and it was about the first matter in respect of which he had got ahead of him. Hitherto Sir William had done all the things that he (Professor Armstrong) ought to have done. He ought to have been Sir William's predecessor in the Chair of Chemistry at Cambridge, but perhaps if that had happened he would have become so respectable that he would not have trained Sir William. Perhaps he would be quite harmless as the result of the treatment that one received at these ancient universities, and which did not extend to the Metropolis.

A Mathematical Machine

At the end of his two years' training at the College, Sir William was nothing but a mathematical machine. Professor Armstrong had on one occasion set him the task of attempting to sulphonate bromo camphor, and he had distinguished himself by doing nothing beyond getting into a hopeless tangle. One day Professor Armstrong had the inspiration to say to an assistant: "Take this fellow in hand and give him something he can do." In a short time, however, by some magic process, Sir William had fingers better than his teacher's. He had had the benefit of the engineering and crystallographic training, and had inherited an astounding genius from his parents. That was not nearly the recovery of an apparently lost soul, but it was the beginning of the camphor story; camphor sulphonic acid was the outcome of the work, and camphor sulphonic acid, in the hands of Sir William and others, had played a great part in unravelling the whole story of optical activity.

Sir William had soon become Professor Armstrong's lecturer assistant; those holding such posts had very soft jobs, for they did not lecture, but they had nearly all their time to themselves. But Sir William had made the best possible use of his time, particularly with Kipping, and the two had put out a variety of work of a novel character. Then Sir William had been transferred to the New Cross School, where he had been entirely on his own, and had begun to show the extraordinary ingenuity and grasp which had been his characteristics.

Pioneer Work

Sir William had not said very much of the early history of the tetrahedral carbon hypothesis. This was not the occasion on which to go into that, but when the history of the matter came to be written fully it would turn out that the merits of the two men whose names were first associated with the work had been greatly exaggerated. As Sir William had shown, particularly at the end of his address, Pasteur was the real discoverer; he had put the tetrahedron into van't Hoff's hands and van't Hoff's great service was that, having some knowledge of solid geometry—which was an unknown subject to chemists in those days—he had pointed out the consequences which followed from the adoption of the tetrahedral hypothesis.

The real work was done when Pope resolved the active nitrogen compound; he was the first to do it. Then he had gone further at once and had dealt with other elements—sulphur, tin, and several others—and the work had had consequences beyond those of the tetrahydral hypothesis, because when he had shown that he could get optically active sulphur compounds he had for the first time produced evidence which had settled the long dispute over the valency of sulphur. That was a great step forward. Then later he had developed a piont of view which went altogether beyond the van't Hoff hypothesis, and which he had dealt with rather fully in the lecture, in regard to the peculiar form of stereo-isomerism. So that in a great variety of ways he had carried the subject forward in many directions, and when the history of the subject came to be written it would be made clear that he had been the great contributor to this subject of stereo-isomerism.

There was another point to which Sir William had not referred, owing to his undue modesty, and that was the development of a real theory of space chemistry by dealing with a solid. His crystallographic work, necessarily, had had repercussions on his own mental attitude. He had become associated with a great geometrical genius, Barlow, and together they had developed the Barlow-Pope hypothesis. Unfortunately, he had dropped that like a hot potato. But potatoes grew cold and fit to handle in the course of time, and Professor Armstrong hoped that Sir William would pick up that potato again and study it. He trusted that one effect of the award of the Messel Medal to Sir William would be to force his attention back to that subject. Something ought to be said also with regard to Sir William's university work.

Sir William Pope's University Work

There was his great achievement of having unified chemistry at Cambridge, which was to his credit; he had brought all the college laboratories, not exactly into one hat, but into one one mass of bricks and mortar, and had brought about a development of the subject which would not have been possible under the old conditions. One wished that for a time he could be transferred to Oxford and be allowed to produce the same effect there. It was very much wanted. But in course of time the subject had been split into so many chairs that one was not sure that the last stage was not worse than the first. Whether or not Sir William would do anything to stop the splitting of chemists into sub-atomic proportions one did not know, but it seemed that that needed doing at the present time.

Sir William had had also a great social experience. He had become a goldsmith, and as a consequence he had played an extraordinarily important part in civic life as Grand Warden of the Goldsmith's Company. In that connection he had shown ability of the first order as a man of affairs. Professor Armstrong confessed that he was very perturbed

by the present disunited condition of the chemical profession, and he begged Sir William to throw chemistry aside, to take on the chemists, and to give his best attention to the unification of the profession. One felt that it was almost in a worse state than the world at large, that it was as unprepared with a policy as the world seemed to be. The profession needed all the experience it could obtain to put it straight, and men such as Sir William, who had had a wide experience, were the men to help.

Diplomat and Man of Science

Dr. F. H. CARR, (past president), seconding the vote of thanks, reminded the meeting of the distinguished services Sir William had rendered to the Society during his presidency, and especially during his memorable visit to the section in Canada. As a diplomat and as man of science he had left behind him there a profound impression, the echoes of which were still heard by every visitor to Canada. In honouring him by the award of the Messel Medal they were honouring the Society by adding so distinguished a name as his to the already distinguished list of the recipients of the medal. He was plastered over with honours, decorations and medals, so that there was scarcely room to carry another, but the members of the Society were glad to be assured that, despite that, he would wear this honour in the forefront of the many he possessed.

Professor F. S. KIPPING recalled his association with Sir William 35 or 40 years ago, when they were working in Professor Armstrong's laboratory at the Central Technical College. He was not sure that the post of an assistant at the Central Technical College was so soft a job as Professor Armstrong had suggested; at any rate, when they had heard Professor Armstrong approaching they had seen to it that their job was not quite so soft as was indicated. In congratulating Sir William, Professor Kipping said he had watched his career with great interest, and no doubt he would continue to add to our knowledge of stereo-chemistry and of many other branches of chemistry.

The PRESIDENT added his personal congratulations and recalled his early and pleasant associations with Sir William, whom he had known for 48 years. They were at school together, he said, and they were students together at the Finsbury Technical College, under Professor Meldola, Silvanus Thompson and John Perry.

Sir WILLIAM POPE, responding, said he was moved by the kind way in which Professor Armstrong had talked about him, one of his oldest and, he ventured to think, most favoured pupils. It was always extremely interesting to hear Professor Armstrong move a vote of thanks, because he did not merely praise, but indicated further work that one ought to have done. Sir William expressed the hope that at some time he would be able to deal with some parts of stereo-chemistry that he had not yet been able to deal with—perhaps the question of crystal geometry.

The Use of Soap in Dry Cleaning

Factors Affecting Cleaning Effect

ABOUT six years ago the National Federation of Dyers and Cleaners instituted a central laboratory scheme in order that their members might receive assistance in difficulties occurring in the course of their work, and that research might be carried out on problems of interest to the industry. During the last two years the research programme has been chiefly concerned with the nature and use of dry cleaning soaps, with the object of establishing the constitution and mode of application of a soap having the maximum cleansing effect when used in conjunction with petroleum spirit. These cleansing trials, according to a paper by Reginald B. Brown, which appears in the July issue of the "Journal of the Society of Dyers and Colourists," were made in a shaking or tumbling apparatus such as that used in leather laboratories. Standard soiled materials were prepared with a mixture of carbon and olive oil to represent the dirt and grease present on garments soiled in wear; woollen material, for instance, was soiled by tumbling 2.5 gram white flannel for ½ an hour in 200 c.c. white spirit with 0.2 gram fine carbon and 1 gram olive oil. Cotton, silk and artificial silks require a higher proportion the soiling mixture to give a suitable grey colour. The patterns thus obtained were shaken in the cleaning solvent under varying conditions and with a variety of added substances.

A Comparison of Commercial Soaps

This method was adopted for the comparison of a number of commercial "benzine soaps" and later, to determine the best composition for a soap to be prepared in the works by the user. The effects of variation of time, temperature and proportion of soap to liquid and material were ascertained and also the effect of the presence of water in the cleaning spirit, the material and the soap Ammonia soaps were compared with potash soaps and the latter were prepared with a variety of commercial "oleins" consisting of oleic acid alone or in mixture with stearic and palmitic acids. Additions were also made of bodies of the cyclohexanol group and of fine-oil products. Soaps made from triethanolamine were also included in the trials.

The general conclusions when working with white spirit as the solvent were that the goods should not be completely dried before cleaning or, if dried, should be allowed to regain their natural moisture; that the proportion of soap to be added is approximately 1 in 400, excess having a tendency to diminish the cleaning effect; with this proportion of soap the maximum cleaning effect is produced in 20-30 minutes and at a temperature of 25°-30° C.; the best soap is a potash soap in which 5-10 per cent.. of fatty acid is unsaponified; the addition of ammonia in the machine is not advisable and ammonia soaps are less effective than potash soaps; triethanolamine soaps are not at present a practical proposition under usual cleaning conditions, and additions such as cyclohexanol are unnecessary and uneconomical.

Effect of Different Cleaning Spirits

Variations in the cleaning spirit were also tried, the solvents compared being light petroleum spirit, white spirit, solvent naphtha, carbon tetrachloride and trichlorethylene. From these trials it was concluded that the lower boiling fractions of petroleum spirit have a more rapid cleaning action than the higher; solvent naphtha and the "non-inflammable" solvents are still more rapid in their effect; when treatment is continued for 20-30 minutes the difference between the action of the various solvents almost disappears, and white spirit takes a much higher place; the non-inflammable solvents, like petroleum spirit, require the addition of soap to produce their full cleaning effect.

Most of the modern plants devised for the use of carbon tetrachloride and trichlorethylene do not include any provision for the addition of soap and its use may be attended with difficulty in re-distillation or may possibly accelerate decomposition of the solvent and consequent attack on metal parts. Possibly the introduction of an agitator with activated carbon in conjunction with the filters used would remove this difficulty; experiment shows that a simple treatment of this kind removes over 90 per cent of the soap and grease from the soiled spirit. A preliminary study has also been made of the action of dry-cleaning solvents and soaps on the colours of dyed and printed fabrics. Loosely fixed pigments or colours produced on the fibre may be affected and designs produced by spraying or stencilling with certain spirit colours or cellulose "dopes" may be removed entirely. A few vat colours and others are partially soluble in cleaning spirit and a detailed examination is being undertaken.

Fertiliser Production in Greece

FERTILISER production in Greece is confined to the Greek Chemical Products and Fertiliser Co., Inc., headquarters in Athens and a large plant in Piraeus. The company's annual output is approximately 40,000 tons of superphosphate, 45,000 tons of mixed fertilisers and miscellaneous chemicals for use in agriculture and industry.

Some Points on Trade Mark Law

By JERVIS ROSCOE, B.Sc., Barrister-at-Law

THE law relating to trade marks is of outstanding importance to manufacturers and traders, since a good trade mark becomes associated in the minds of the purchasing public with the goods of a particular trader or firm. This association plays an important part in building up a goodwill without which a business is in an unenviable position. It is desirable, therefore, to choose as a trade mark a mark which may be registered, because the owner of a registered mark can prevent others from using the mark far more easily than the owner of an unregistered mark can maintain his rights.

What Marks are Registrable

In order to be registrable a trade mark must be capable of distinguishing the goods of a particular trader from those of others. It is clear that the mark must not resemble any mark already in use, nor must it describe the goods. Anyone selling goods of a similar kind is equally entitled to describe his goods and the descriptions would probably be almost the same. It must not be a surname, nor a geographical name. Every man is at liberty to use his own name in connection with his own goods so long as he does not use it in a manner calculated to lead to the belief that the goods are those of someone else of the same name, and usually no man is free to claim the exclusive use of the name of the town or district in which the goods are made.

A new mark in order to be registrable should be either: (*a*) An invented word which must have no direct reference to the nature and quality of the goods nor must it be a mere mis-spelling of the name of the goods; (*b*) an ordinary word which is not descriptive of the goods nor a surname or geographical name; (*c*) a signature of a trader as distinct from his name in ordinary letters; (*d*) a name represented in a special way; (*e*) any other peculiar and distinctive mark; or (*f*) the proposed trade mark may consist of a combination of two or more of the above integers. In every case the mark must be distinctive as opposed to descriptive; this is of benefit to the trader since his aim should be to get a mark so unusual, so characteristic, that after it has been in use only for a short time the public will associate it with his goods and no others. The more appropriate a mark is for any particular class of goods the more valuable it is likely to be as a trade mark.

The Trade Mark Register

The Register of Trade Marks is divided into two parts. New marks which are *adapted to distinguish* particular goods are registered in Part A. Marks which have been used in connection with goods for two years in this country and which are *capable of distinguishing* such goods as being the goods of a particular manufacturer or trader are registered in Part B. The register, moreover, is divided into a large number of classes. If the owner of a mark proposes to use it in connection with a variety of goods, application should be made to register the mark in as many classes as is necessary to protect the mark when used.

Registration only confers the *exclusive* right to use the mark upon or in connection with the goods in respect of which it is registered. The owner of the mark cannot sue for infringement by reason of a use upon goods which are similar to those in respect of which it is registered but which are in a class for which it is not registered, however great the similarity may be. A mark which might be refused registration in one class because it too closely resembles a mark already registered in that class might well be allowed to be registered in one or more of the other classes. Where the mark consists of a number of features, such as a signature and a fanciful border, the registration may be refused unless the owner is willing to state that he lays no claim to a particular features of the mark which is already well known, in the class of goods for which he proposes to use the mark. If the owner intends to use part of a mark separately that part should, if allowable, be separately registered, since only what is registered is protected.

The advantage confered by registration in Part A of the register is that it confers upon the owner of the mark the exclusive right to use the mark so long as it remains upon the register. Thus once the owner has satisfied the Court that the user complained of is so close to the registered mark as to constitute an infringement, the infringer can only escape the results of such user by a successful motion to rectify the register, which results in the removal of the mark. The longer the mark remains upon the register the more difficult it becomes to succeed upon an application to remove it and after seven years the mark becomes impregnable except upon the ground that the first registration was obtained by fraud, or that the owner himself has misused the mark as by granting a licence to someone else to use it.

The advantage conferred by registration in Part B is not so great because the registration of a mark is only *prima facie* valid, and anyone who wishes to get the mark removed from the register has to prove that the mark wrongly remains on the register. Before the days of registration the owner of the mark had to prove affirmatively that to the public the mark meant his goods and this was often difficult and expensive. He also had to prove that the mark complained of was deceptive.

The Assignment of a Trade Mark

The registration of a trade mark confers upon the owner the exclusive right to use the mark for the purpose of indicating that the goods are his; this may include use upon catalogues and advertisements but such use by another person does not necessarily amount to infringement of the mark. It must never be forgotten that the mark indicates to the public that the goods bearing it are made or selected by the owner of the mark and it is not possible therefore for the owner of the mark to allow others to use it on their goods. The mark may not be assigned unless the goodwill in the business relating to the mark is assigned too. Nor may licences be granted under a trade mark. There have been many cases where traders or manufacturers who owned valuable marks have, through ignorance or inadvertence, allowed others to use their marks with the result that the marks have been held by the courts to be deceptive and have been removed from the register, whereupon they have become open for use by all who wished to use them. That part of the law dealing with assignment of goodwill together with the trade mark is difficult and where it is wished to assign, great care should be taken to avoid risk of invalidating the mark.

The Cardinal Question

A clever trade mark may form the centre round which a great business develops. The mark should be registered to cover all goods for which it is to be used now, or in the future. No attempt should be made to assign the mark apart from the goodwill and this should only be done with great caution. A careful watch should be kept to see that the mark is not being copied and if it is, immediate action should be taken lest it can be said that by such other user the mark has lost its distinctive quality and is invalid. For those who have neither the time nor the wish to probe into the intricacies of trade mark law it is well to remember that the cardinal question when considering either the choice of a mark suitable for registration, or the problem of whether a mark infringes the rights of the owner of a mark already registered, is this: Does the mark deceive the public? No mark which might deceive by creating a false impression as to the origin of goods should be registered, and the use of a mark which is deceptive will justly be prohibited.

A NEW use has been found in Germany for aluminium, namely in the form of very thin gramophone records, suitable on account of their lightness for week-end trips and for export purposes. They weigh only 50 grams for a maximum thickness of ½ mm. as compared with 200 grams and 2 mm. for ordinary records. The aluminium record is not affected by weather conditions. Its transparent varnish layer cannot be damaged by bent or blunt needles. Moreover, after being heated up to 80° C. used records can be repressed by means of fresh matrices. From the acoustic point of view the aluminium record is stated to be in no way inferior to the ordinary type.

Economic Conditions in Norway

Chemical and Metallurgical Industries

FINANCIAL and commercial difficulties arising from international causes, which affected the whole world in 1931, were enhanced in Norway by events of more local significance. Industrial activity was brought to a standstill for five months owing to a labour conflict of unprecendented dimensions, and later, the situation was further complicated by a serious banking crisis. There was a heavy fall in the value of both imports and exports in 1931. In the case of imports it amounted to 19.6 per cent. in that of exports to no less than 31.8 per cent. of the figures for the previous year. The United Kingdom share of Norway's imports, however, showed a notable improvement, and according to a report* published by the Department of Overseas Trade an opportunity now exists for obtaining a firmer foothold in this market.

Sales of Chemicals

Sales of heavy chemicals were much reduced in 1931, mainly owing to the labour dispute, which caused a stoppage of six months in the pulp and paper industry. The pulp and paper mills had a bad year in 1931. Work was at a standstill for six months on account of the wage conflict and the industry suffered under the general depression as well as from the uncertain situation created by departure from the gold standard, which was not followed by a corresponding rise in the prices obtainable in Norwegian kroner. The value of exports fell to Kr. 100,100,000 from Kr. 172,600,090 in 1930. In the case of chemical pulp prices sank, though not very heavily, for sulphite cellulose, but the level of prices was very low. The output of chemical pulp for sale was less than half of that in 1930, *viz.*:—bleached sulphite 75,000 tons; unbleached sulphite 55,000 tons; unbleached sulphate 7,300 tons.

By agreement between Continental manufacturers the production of sulphite cellulose (except for making artificial silk) was to be restricted by $21\frac{2}{3}$ per cent. from November 1, 1930, till December 31, 1932: so far as Norway is concerned the stoppage during the labour conflict has rendered limitation of output in 1932 unnecessary, and in March the mills were running full time. For mechanical pulp prices were weak throughout the year. Norwegian, Swedish and Finnish manufacturers agreed to restrict their output of wet pulp to 50 per cent. of capacity, but several mills with up-to-date plant remained outside the cartel, and no steps have been taken to prolong the agreement, which ran out on March 31, 1932.

Iron and Steel Trade

Conditions in the iron and steel trade were very much worse than in 1930, owing first to the diminishing industrial activity, which was a sympton of the general depression, and later to the labour dispute, which brought work to a standstill for a long period. No sooner had the workshops resumed activity than the gold standard was abandoned and importers began to have difficulty in procuring foreign valuta for forward delivery at a fixed rate of exchange. Norwegian producers of iron and steel bars have benefited considerably by this circumstance and by the campaign in favour of using native goods. The proportion of business secured by the United Kingdom is reported also to have increased at the expense of countries with undepreciated currencies, in such goods as black and galvanised sheets and steel bars and plates, but Continental mills are stated to have reduced their prices recently with a view to meeting the United Kingdom competition. It is anticipated that imports from the Continent will continue to fall off and that the use of Norwegian and United Kingdom products will increase correspondingly. Demand is, however, small, as the workshops have little work on hand and the outlook is anything but promising.

Exports of ferro-silicon were practically the same as in 1930, but they represented only about half the capacity of the Norwegian factories. The demand for this alloy is stated to be decreasing heavily; consumption is estimated to have been about 50 per cent. less than in 1929 and a further decline in 1932 is anticipated. In the case of ferro-chrome conditions were somewhat similar. There was a heavy decline in exports of ferro-manganese from 47,848 tons in 1930 to 32,030 tons in 1931. It is stated that production proceeded fairly normally during the past year, but that large stocks remain unshipped and operations are now much restricted.

Non-Ferrous Metals

The market for non-ferrous metals followed more or less the same lines as that for iron and steel. Sales appear to have improved appreciably for a short time after the labour conflict was settled, and a considerable degree of house building activity helped to maintain the volume of business. Norwegian producers are reported to have gained still further ground, especially in the raw materials B/S copper, smelter, aluminium ingots and nickel, and in the semi-manufactured goods copper tubes, bolts and cables, brass tubes and rails, and aluminium sheets, bolts and wire, to which must be added since September copper sheets and rails and brass sheets and bolts.

Tin and lead, in sheets and tubes, have been delivered on the gold basis have fallen off strongly, chiefly to the advantage of Norwegian mills, which expect to continue to reap the benefit so long as currency conditions remain unchanged. They experience, however, at present, keen competition from Sweden in copper and brass sheets and tubes and condenser tubes.

The output of copper, of which A/S Sulitelma is the chief producer, was considerably less than in 1930 and exports amounted to 3,377 tons as against 4,784 tons in the preceding year. Nickel exports, on the other hand, increased from 708 tons in 1930 to 2,286 tons in 1931 and showed a further increase in January, 1932. Exports of refined zinc from the Franco-Belgian works at Eitrheim rose from 27,097 tons to 45,399 tons, but in January they were lower again. In the case of crude aluminium exports were slightly greater than in 1930. Production was well maintained, but stocks have been accumulated and most of the factories are now working short time. A large proportion of the aluminium exported in 1931 was shipped to Soviet Russia under the Norwegian export credits guarantee.

Electro-Thermic Industries

The quantity of calcium carbide exported was about 24,000 tons in 1931 as in 1930 and the United Kingdom was the principal market. The works are now operating at rather under 50 per cent. of capacity in spite of the fact that carbide is also used as a raw material for the manufacture of cyanamide. The output of cyanamide has decreased very greatly, and in 1931 exports declined to 14,494 tons from 48,509 tons in 1930. Except in the case of Norsk Hydro-Elektrisk Kvælstofaktieselskab the electro-thermic industries were not involved in the labour dispute. This concern was, however, at a standstill for five months and exports of nitrates decreased considerably. In spite of the lower output last year, it has now been found necessary to restrict operations to about 50 per cent. of normal. The net profits of this company for the year ended June 30, 1931, amounted to about Kr. 400,000, as against about Kr. 7,500,000 for the preceding year.

Whale Oil Situation

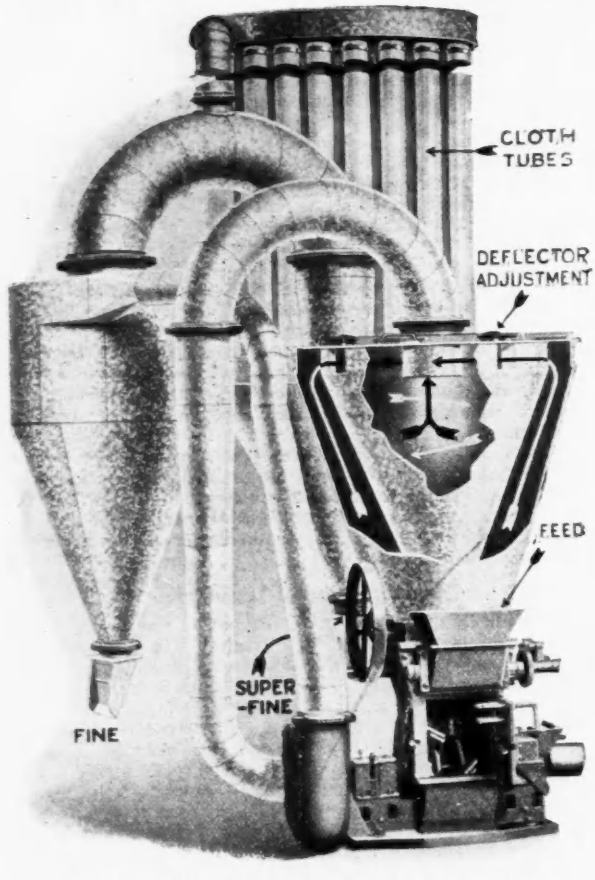
The Norwegian catch of whale oil during the winter of 1930-31 again constituted a record, the production being 2,316,593 barrels (1,690,000 barrels in 1929-1930). No whaling was done by Norwegian companies in the summer season. The bulk of the catch—about 1,517,815 barrels—was sold in advance at £25 per ton for No. 0/1, realising a total of about £625,000, including the by-products. The remainder of the catch, however, proved to be a drug in the market; rumours that the accumulated stocks of whale oil were sufficient for two years' demand depressed the price to about £12 per ton, and even at this price it was difficult to find buyers. Exports of hardened fats, produced finally from whale oil, declined from 32,348 tons in 1930 to 23,839 tons in 1931.

* "Economic Conditions in Norway, March 1932." H. M. Stationery Office, price 2s. 3d. net.

Some Problems of Fine Grinding with Air Separation

By W. A. STAPLETON

GRINDING and pulverising with air separation is particularly applicable where an extremely fine product is required, where a uniform product is necessary, where the raw material is of a damp or sticky nature, or where a dustless grinding operation is required. It can also be adapted to cases where siliceous or other impurities have to be removed, and for the concentration of mineral by removal of the softer impurities. The degree of fineness which it is possible to obtain with air-separation is extremely high. The separating unit itself consists of a double cone, one inside the other, with an annular space between, into which air and material is introduced. The material, after being induced through the annular space mentioned above, is drawn into the inner cone through a series of port holes. Each port hole has a pair of vanes



The Raymond Pulveriser complete with Air Separator, Cyclone Collector and Tubular Dust Collector

pivoted and moveable, enabling them to be placed at different angles to the periphery of the inner cone. The material entering the inner cone can thus be made to enter at any angle. When the vanes are set at right angles to the inner cone, *viz.*, pointing straight towards the fan intake, no centrifugal action will be produced and so most of the material will enter the fan inlet pipe, thus giving the coarsest grade; on the other hand, even when there is no cyclonic action, the relatively large particles will drop out, due to the expansion of the air within the inner cone.

The different angular positions of the deflector vanes are indicated by a pointer on a calibrated dial on the outside of the separator. The pointer moves through the same planes as the vanes. When the finer product is desired, the vanes are moved on a quadrant, so that they sit at an angle with the periphery of the inner cone. The material is thus given cyclonic motion and more particles are thrown out, which delivers a finer product to the fan. The sharper the angle at which the deflector vanes are set, the finer will be the finished product, until when they are set approximately tangential to the inner cone so much of the product will be thrown out that the material entering the cyclone will be extremely fine. These different degrees of fineness can be obtained by setting the pointer at the different positions on the dial, and once set, it will maintain a uniform grade. The material rejected from the inner cone passes through a flap valve attached to the bottom of the inner cone into the space at the base of the outer cone mentioned above. The fines are blown by the fan into the cyclone collector, where the material is separated from the air and discharged to bins or packing machinery, while the air returns to the separator to pick up more material and go through the same cycle.

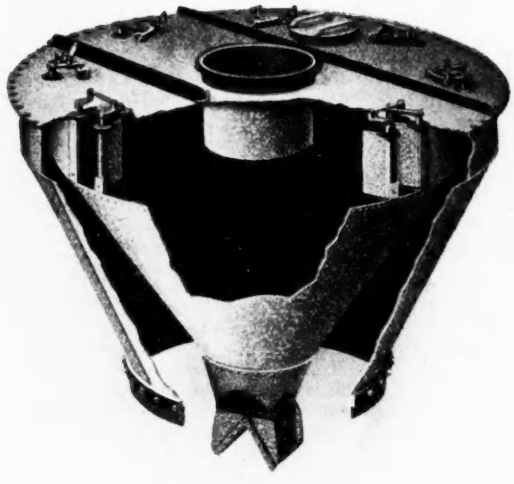
Principal Applications

In the application of air separation to pulverising and grinding equipment, it is necessary to differentiate between its two main applications. In one application the air separator is an integral part of the grinding unit, or rather the pulverising or grinding unit is part of the separator. Here the double cone fits immediately above the pulveriser and the return air enters beneath the grinding surface, and takes away the fines with some of the coarse immediately they are made. The air actually enters the grinding chamber through ports set at an angle so that material receives a rotary motion just as soon as it begins to travel up and while in this motion the diameter of the annular space becomes larger and larger, so that the rather coarse particles keep dropping out before they enter the inner cone, where the final and complete separation takes place. The separator has thus only to handle a comparatively fine product, which increases its efficiency.

There are certain cases, however, where it is not desirable to have the tailings from the inner cone drop back to the grinding medium. In such cases a screw conveyor is inserted within the inner cone and these tailings are removed. The present commercial requirements for very fine material are mostly for those used as bases for paints, fillers, for paper and rubber, and for many other commercial applications. Such materials as lithophone, barytes, blanc fixe, talc, whiting, calcite, graphite and other carbon products are being reduced to a fineness of 350 mesh. In this connection it might be mentioned that the term fineness, as used at present, has no absolute significance. Many people use it rather in a loose sense. For example, some will say that they require a 200 mesh product when they really do not mean that they need a product so that 100 per cent. will pass through a 200 mesh sieve, but only desire a certain percentage to pass through this size screen. The percentage may be high, such as 97 or 98 per cent., but even at this percentage there is all the difference in the world between such fineness and a 100 per cent. fineness, the capacity in many cases being reduced by over 50 per cent. Even when the fineness is mentioned as, say, 95 per cent. through 200, it is not even then definitely defined, since we may have two materials, both testing 95 per cent. through 200 mesh and one be still finer than the other. That is to say, in one sample there might be over 85 per cent. of 300 mesh material and finer, and in the other there might be very little impalpable powder. Also, in the one the remaining 5 per cent. will go through an 80 mesh screen, while in the other there will be particles left on a 60 mesh. These results are produced by different systems of grinding and separating and it is here that air separation shows to greater advantage. Even though a comparatively coarse product might be desired, the coarseness will be uniform and will not contain any large particles.

Uniformity in Grinding and Separating

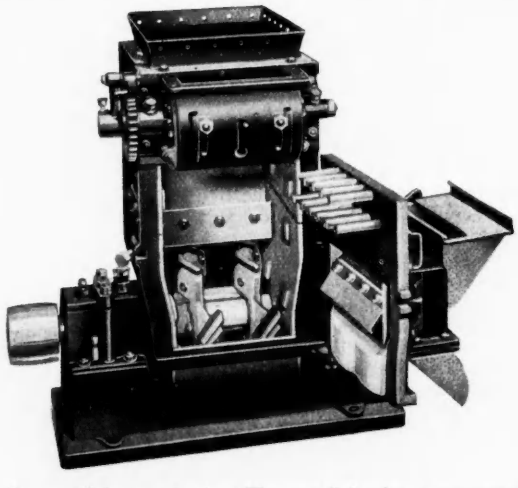
In many cases a uniform product is just as necessary and desirable as is a fine one, as in the case of phosphate rock (which is mixed with sulphuric acid to produce soluble phosphate), bauxite (for alum manufacture), or pulverised coal for furnace firing. In the manufacture of acid phosphate the analysis of the rock is known in terms of tricalcium phosphate, iron and alumina oxides, etc., so that the amount of



The Raymond Double Cone Separator

acid and its strength can be figured out for the guidance of the mixer. He can then obtain an acid phosphate which is in a good mechanical condition, containing a maximum amount of available phosphates and a minimum amount of insoluble. The finer the rock is ground, the quantity and strength of the acid used can be reduced, but for every grind and analysis a certain amount and strength of acid will give the best results. If the uniformity of the grind of rock varies, however, the calculations of the mixer will be disturbed or upset, and he will obtain a product which will be in a very poor mechanical condition, sticky and lumpy, sometimes necessitating re-milling or the addition of more rock. When his rock comes uniform in grind he can once and for all fix on his proportion and forget about it, knowing that air separation is bound to give him a uniform product.

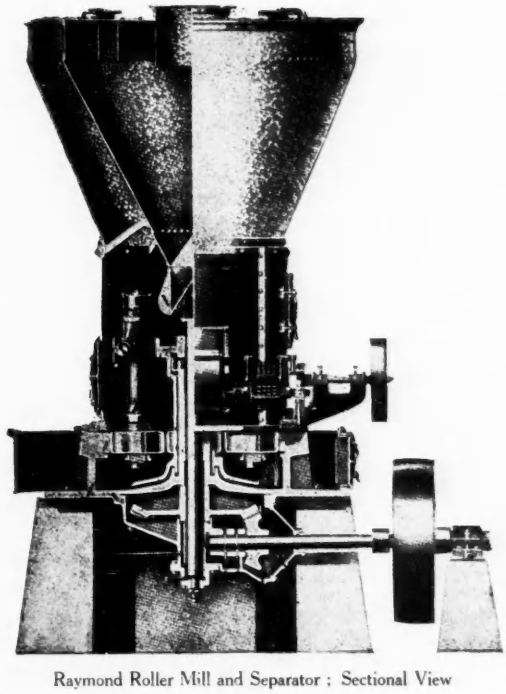
When pulverised coal is used as a fuel, uniformity and fineness are also of great importance, for the coal is usually blown into the furnace by a primary current of air which is insufficient for combustion. Complete combustion takes place when the coal comes into intimate contact with a source of secondary air. After the operation is started the velocity and volume of air is regulated to suit the combustible in the coal and its fineness. As the amount of air necessary for perfect combustion of the coal will not materially vary over long periods the air can be once regulated and left that way, providing the uniformity in fineness does not change. A finely ground coal needs less air with a comparatively low velocity, since it presents a relatively large surface and does not tend to drop out of the air current. When the grind becomes coarser more air and a higher velocity will be required to keep it in suspension, so that the operator will constantly be obliged to manipulate the air controlling devices, which, of course, leads to low economy.



Raymond Pulveriser, showing "Throw-out" Attachment swung open

Materials of Sticky or Gummy Nature

In dealing with materials of a sticky or gummy nature, such as gums, resins, pitch, etc., air separation has definite advantages. There is no rubbing action necessary to force material through screens or bars. The less this material is handled, the better. As soon as the beaters hit the material, the air removes the fines as fast as they are generated, and does not give them a chance to ball up and stick. Some materials grind better when they are hot, others when they are cold. For example, under certain conditions, the moisture content of kaolin is high and when fed to any type of grinding equipment, particularly when a fine product is required, it will soon sweat and stick. To handle this situation it was found that if the return air was heated, such clay pulverised very satisfactorily, and showed no tendency to stick. To heat the air a small coil of steam pipe was placed in the return air and the necessary temperature of the air obtained.



Raymond Roller Mill and Separator ; Sectional View

Where the material handled is poisonous or where the production of dust in the grinding room is prohibited, air separation is the only system that can be effectively used, for when properly designed and erected, the equipment will give absolutely dustless conditions. This is of particular advantage when handling calcium or lead arsenates, lead products and insecticides. Another important application of air separation is in the cleaning of a product from its impurities, which is of great importance, as in the pulverisation of hydrated lime, clays, litharge and other oxides, phosphate rock and similar minerals.

From what has been said about the theory of air separation it can readily be seen how we can separate a mixture of two minerals if they are of the same size but of different specific gravities, or if they are of the same specific gravity, but of different sizes. From this it follows that it is also possible to separate two products if they are the same size, and the same specific gravity, provided that one is "harder" than the other. By regulating the degree of grinding it is possible to reduce the softer part to a comparatively small size, whilst

the harder particles are automatically thrown out from the better type of mill or discharged from the inner cone screw conveyor in the roller mill. Hydrated lime, when it comes from the hydrator, will usually contain small balls of pure hydrate core, overburnt material, clinker and sand. When this mixture enters the pulveriser the air immediately takes up the fine hydrate, the rest drops to the beaters where the lumps of hydrate are beaten up fine enough for the air to handle, whilst the impurities mentioned are automatically thrown out. Here, without any attention whatever, the pulveriser will deliver a pure, fine white hydrate at the cyclone collector and the impurities at the throw-out.

Concentration of Mineral Phosphates

Concentration of minerals in this manner is being done on a large scale in the case of Tennessee phosphates. These particular deposits consist of hard phosphate contaminated with clay, which, of course, brings down the percentage of tricalcium phosphate and raises the percentage of iron oxide and alumina. The latter ingredients are objectionable, particularly when the rock is to be acidulated, as the iron and alumina eat up acid to form insoluble sticky sulphates without adding anything to the commercial value of the mixture. The aggregate is brought to the pulveriser direct from the dryer. Here the clay is pulverised and taken off by the air, while the phosphate contents, consisting of extremely hard nodules, are automatically thrown out. In this connection, it might be interesting to add that a further concentration is obtained by passing this particular concentrated material from the throw-out to a roller mill, the grinding characteristics of which are intense enough to break up the hard nodules. It is characteristic of Tennessee brown phosphate that the harder the rock the higher the grade. When this aggregate goes to the roller mill the lower grade material is immediately reduced to a powder, so that it can be handled by the fan, while the harder particles are at first only reduced to a granular state. These granular particles, in the ordinary course of events, would be returned by the inner cone to the grinding surfaces and reduced to a powder, but here the granular particles are not permitted to be returned by using the inner cone screw conveyor, and so remove them, for they are richly concentrated in tricalcium phosphate. This property of air separation is also used for obtaining a more or less granular product from many other materials; in the treatment of mono-calcium phosphate, tartaric acid, citric acid and sugar, for instance, a granular product is sometimes required with a minimum percentage of fines. The equipment is then so adjusted so as to do as little fine grinding as possible, that is to say, the product is removed from the inner cone by means of the screw conveyor and this product will be granular, since it has only been exposed a short time to the grinding action. The fines can be controlled to a minimum and are discharged in the usual manner through the cyclone collector.

Company Registrations at Somerset House

Statistics for First Half of 1932

A STATISTICAL report relating to new companies registered in England during the half year ended June 30, 1932, has been issued by Jordan and Sons, Ltd., company registration agents, Chancery Lane, London, W.C.2. In the chemical industry three public companies were registered, with a total capital of £394,500, and 275 private companies were registered with at total capital of £5,694,390, making an aggregate of 278 companies with a capital of £6,088,890. The grand totals for all companies registered during the half-year, compared with the figures for the corresponding periods of 1931, 1930 and 1929 were as follows:—

	Public Companies.		Private Companies.		Totals.	
	Number Registered.*	Capital.	Number Registered.	Capital.	Number Registered.	Capital.
First half of						
1932	108*	5,254,458	4,985	28,803,098	5,093	34,057,556
1931	135	6,380,672	4,202	21,348,880	4,337	27,729,552
1930	185	22,514,450	4,254	37,770,173	4,439	60,284,623
1929	388	105,410,156	4,287	46,927,127	4,675	152,337,283

* In this column are included 39 "Companies Limited by Guarantee" and "Associations Not for Profit" without share capital, such companies being technically public however small the membership may be.

The fact that public company registrations during the first six months of 1932 are down by 27 in point of numbers, and by £1,126,214 in the matter of aggregate capital, as compared with the first half of 1931, and down still more as compared with the corresponding periods in 1930 and 1929, cannot surprise anybody. Not even a Mark Tapley would expect a plethora of big companies to appeal to the public for funds while the financial and commercial air is thick with the evils released from the "Pandora's box" opened in the latter part of 1931. Nevertheless, the figures do not discourage the trembling opinion dawning in the public mind that, at long last, hope is discernible.

Registrations of private companies are up by 783, and the aggregate capital of such companies is up by £7,454,218, as compared with January-June, 1931, and show, further, an increase in number (although a decrease in capital) over the registrations for the corresponding periods of 1930 and 1929. An increase in the number of businesses converted into private companies must not be urged unduly as a sign of returning prosperity, because undeniably some traders fly to limited liability for protection in times of adversity, but in this instance there are indications that a hopeful interpretation may be placed on the statistics.

There was a marked increase in private companies during March and April (during which period, by the way, even public company registrations also began to display a "certain liveliness"). Political considerations are outside the province of the report, but the most reasonable explanation of the "boomlet" in March-April of this year is that registrations increased in anticipation of a trade revival following the tariff duties imposed in those months. During May, registrations fell off somewhat, but in June the upward tendency was resumed.

Millionaire Companies

"Millionaire" companies have been few and far between, numbering but four during the past six months (of which three were "private companies"). They included I.C.I. (Explosives), with a capital of £4,992,900.

Numerous concerns are incorporated with small nominal capitals, which are later substantially increased. By this procedure the heavy outlay on a large capital is postponed. Examples of this in the period under review are one company which has increased the capital of £100 on incorporation to £60,000, another increased from £1,000 to £80,000, and a third from £10,000 to £200,000. In the cases of about 30 companies registered during the half-year and known to have registered increases, the present total capital amounts to approximately two and three-quarter times the original amount.

Incorporation as a company limited by guarantee without share capital has been effected in the case of several concerns, most of these being associations for the protection of various interests. These include the Federation of British Furnishing Textile Manufacturers, Ltd., the British China Clay Producers' Federation, Ltd., and the Reinforced Concrete Association, Ltd.

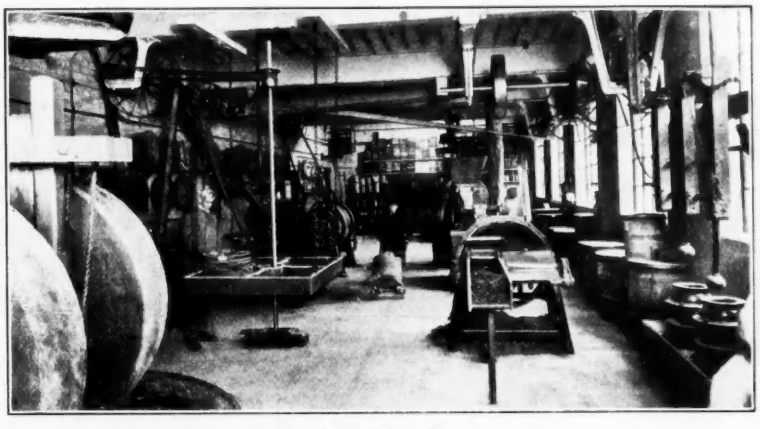
Although the figures generally are much below those of some "boom" years, the incorporation of 5,093 companies cannot by any means be regarded as a slump—especially when it is recalled that in the first half of 1922 (a period of depression which might be regarded as somewhat comparable) there were but 4,040 registrations. As to future prospects, the figures at least appear to indicate that commercial men to not lack initiative in embarking upon fresh enterprises, and are preparing to take advantage of the improvement in trade which it is anticipated will follow the Loan Conversion and the International Settlements and agreements announced and to be made.

New Model Chemical Factory at Leeds

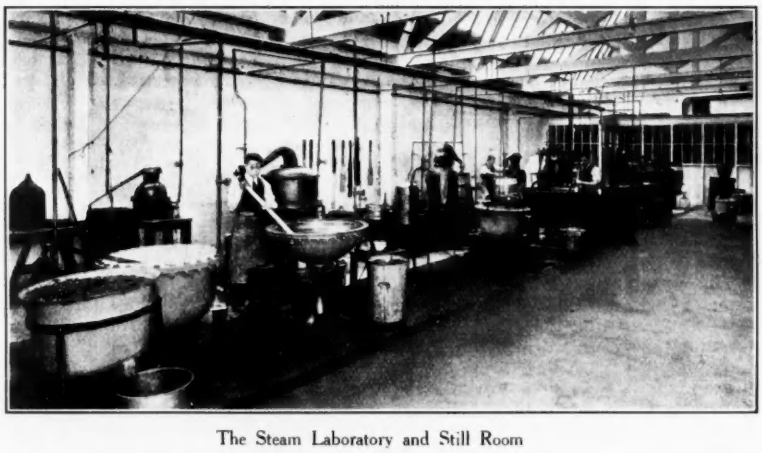
Realisation of a Century's Ambition

NEARLY 111 years have elapsed since the drug and chemical house of Hirst Brooke and Hirst, Ltd., was first founded in 1821. Although in its long history and growth it has occupied no less than three different premises, it was not until as recently as last March that its real ambition of securing a building for its permanent home, adapted to the requirements of the trade, could be planned and laid out from the very beginning to fit perfectly the exacting needs of the modern industrial era.

The realisation of such ambition is the model factory and ofices situate within 1½ miles of all the railway stations in Leeds and within walking distance of one of the principal termini of bus routes of the West Riding. The works have been built on one of the new 80 ft. arterial roads and, in addition, within a stone's throw of the junction of several main approaches to the city. From this frontage arises an imposing Girlingstone façade from the design of Mr. George W. Atkinson, F.R.I.B.A., the architect of the building. The general buying and sales offices of the company face on to the road, and the one floor modern factory, laboratories and warehouse are built behind. The site, covering as it does nearly 100,000 sq. ft., gives ample space for the systematic and efficient layout of some of the most up-to-date premises in the drug trade. The departments have all been planned in just that manner which efficiency demands. All receiving departments have equal access to the entrance, and all despatch departments have immediate access to the loading platforms. The departments nearest to the receiving section are the "heavies" and "dries" where all the bulk drugs are stored. These come from all parts of the world, although preference for Empire goods has for many years been a strong policy of the company. Immediately adjoining is the " grinders " where the numerous edge runners, disintegrators, cutters, sieves and mixers are driven by individual electric motors, each supplied with its own starter. A 4 ton edge runner has for over 20 years ground continually upwards of 400 tons of material a year.



The Drug Milling Room



The Steam Laboratory and Still Room

In the closest proximity are the various laboratories, supplied with their numerous steam jacketted pans, vacuum stills and hydraulic presses, emulsifiers and a series of stainless steel 100-gal. capacity percolators. Separate sections leading from the principal laboratory comprise the analytical room, the D.D.A. room, the granulating room and the toilet room. The D.D.A. room is for the storage of all articles coming within the scope of the Dangerous Drugs Act, and these are kept under lock and key.

Adjoining the laboratory is the pill room with its battery of pill cutters, rounders, coaters, mixers and tablet machines. Whilst the various types of work necessary in the works of a manufacturing chemist are kept separated, they are so compactly centralised as to be ever under the eye and guidance of the company's principal chemist. The cellars and cold storage rooms are immediately accessible and on the adjoining side is the wine cellar where in an equally cold atmosphere are accommodated the large vats with capacities of over 1,000 gal. where British wines, and particularly the celebrated Hirst Brooke's original orange quinine wine, are fermented and matured.

Close by are the packing rooms, which have a full measure of labour-saving machines—gravity fillers, pressure fillers, and the most recently installed machine for rapid filling under pressure maintained by electric pump. This machine handles with ease well over 1,000 bottles an hour, and enables the popular glass sprinkler necked bottles to be filled with ease, as the orifice through which the material passes into the bottles, needs to be no thicker than a hypodermic needle. Here, in addition to the multitudinous range of goods which come under the purview of this department are Hirst Brooke and Hirst's own proprietaries. As in every other manufacturing and packing department, the time of each operation is recorded by means of automatic clock recorders, which stamps the commencement time and completion on a slip bearing particulars, description and numbers of the batch of goods concerned.

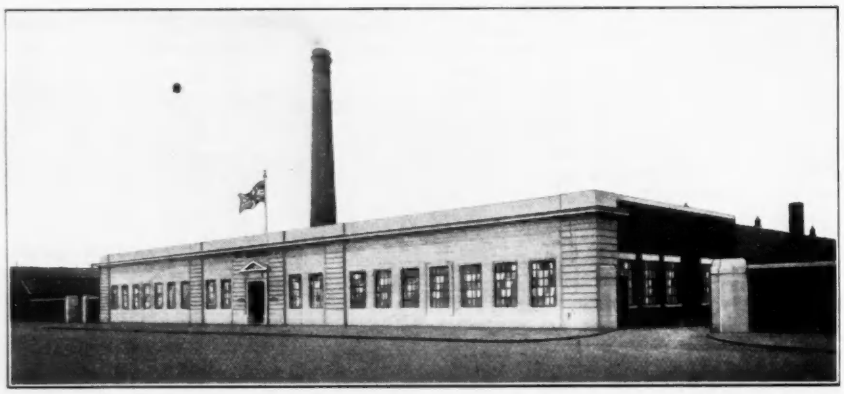
Parallel with the laboratories and packing rooms is the " wets " counter with its stocks arranged in perfect order. Adjoining the " wets " is the " patents," comprising a stock of upwards of 4,000 items and covering the whole range of proprietary goods. Next to it, with equal accessibility to the despatch counter is the " sundries," which in its completeness of variety is an assets shared by but few wholesale chemists in the country.

Adjoining the despatch is the loading dock which has been specially designed with a view to convenience and speed of loading. In the yard ample room is available, and on the opposite side there is a separate structure where inflammable materials and such goods as acids in bulk are stored. At the other end of the site and adjoining the main road, but unseen in itself, is the garage necessary for housing the home fleet of motors, express vans and motors cycles. Conveniently near is the returns room, whilst next to it is the bottle washing room and bottle stores. The bottle room with

its several cellars is, by reason of its compactness, able to house several hundred thousand bottles, all of which are stored with a view to accessibility.

The printing room contains up-to-date machinery to the value of approximately £3,000. Prominent amongst the machines is the double demy Wharfedale press, capable of printing pages at the rate of 1,500 per hour. The company has been long associated with designing and production of showcards and the latest plant has been installed, and it is now able to produce showcards of all varieties, sizes, styles and colour.

dation. In the inquiry bureau is situated the most complete intelligence and inter-communication system which modern electrical and mechanical systems can provide. There is a staff locator system unique in itself, and a 35-line private automatic exchange, a replica, on a small scale, of the equipment utilised by the G.P.O. There are specially constructed Fanfold biller typewriters, fed with continuous stationery, which the company purchases by the mile, electrical book-keeping machines, and other calculating machines and services which provide the statistics and records of production and sales indispensable to efficient management.



Exterior View of the New Model Factory

The showroom, of which the company is immensely proud, adjoins. Its modern showcases, carried out throughout in finest walnut entirely backed with mirrors and supplied with chromium plated fittings, are in themselves a testimony to progress. The most modern system of lighting has been installed and in this one room alone there is approximately 6,000 candle-power. Its furnishings imply rest and comfort. Whilst there is much to encourage the actual purchase of goods, there is also much of an educational value. One case, which is set apart for the display of galenicals and bulk drugs, contains many rare samples.

The offices have in their lay-out that spaciousness and lightness to which particular attention has already been drawn. In addition they have that distinctiveness of comfort and finesse which are the hall-mark of up-to-date office accommo-

The works are heated throughout by the most novel designed equipment obtainable in this country. Through the medium of steam and electricity, an equable temperature is maintained by a thermostatically controlled heating system, which ensures that each department is kept at a constant and desired temperature, and a master control over all thermostats is established in a centralised control room. For the offices, however, hot water heating was considered more suitable, which works through the agency of calorifiers.

A canteen has been provided which includes those amenities usually associated with such work, and comes under the control of a special committee, which also has under its jurisdiction a cricket team, social club, dances, whist drives and other channels of interest which make work so much more enjoyable.

Canadian Diatomite

Used as a High Temperature Insulator

A SURVEY conducted by the Dominion Department of Mines at Ottawa shows that deposits of diatomite occur in at least 150 localities throughout Canada, principally in British Columbia, Ontario and Nova Scotia. The value of this substance as a heat and sound insulator, filter medium, and as an admixture in concrete, has been known for some time. More recently its value as a constituent of asphalt battery boxes and hard rubber products has been recognised. It is well adapted for use as a high-temperature insulator in industrial plants, especially where heat losses, due to faulty insulation, cost millions of pounds annually.

Diatomite is composed of silica, and is, consequently, not affected by weathering, nor by the commonly used strong acids. It will withstand temperatures up to 3,000° F. without fusing, but has a tendency to contract suddenly at temperatures in excess of 1,500° F. For service above this critical point the diatomite must first be shrunk by burning to a temperature slightly higher than that for which it is to be used. It may be used either in the natural state or as a burnt powder. More frequently it is made up in the form of bricks, slabs, tiles, cements, aggregates, pipe coverings, etc. The strength of the bricks varies in accordance with the burning temperature and with the amount of clay or other bonding material used. Those cut direct from the beds and used in the natural state have the highest efficiency, but are structurally the weakest. When used in the form of bricks in furnace insulation, care must be taken to see that the bricks do not come into direct contact with the flame. It has been noted that with a contact temperature of 1,600° F. between the firebrick, and a 4½ inch thickness of diatomite brick, a saving of 60 per cent. in the heat that would otherwise be lost has been effected. This type of insulation is adaptable to boilers, furnaces, kilns, ovens and to numerous other heating units. Diatomite mortars are used for jointing the bricks and for filling inaccessible places. Insulating concretes, composed of diatomite, calcined aggregates, and powder and cement are also being used, particularly for monolithic, semi-refractory furnace doors, designed for temperatures as high as 1,800° F.

The maximum temperature to which a diatomite product is to be subjected should be ascertained before purchasing to ensure the highest efficiency. Unburned diatomite has its maximum insulation value at 1,200°, and should, accordingly, be employed at temperatures below that figure. A prolific field exists in British industries for the use of diatomite in securing fuel economies, and the deposits in Nova Scotia are strategically located to supply this potential market.

Heat Transmission in Industry

Basic Principles and Methods of Calculation

KNOWLEDGE gained by practical experience usually enables the engineer or furnace designer to pursue empirical methods with considerable success; indeed the conditions involved in the working of industrial plant are as a rule so complicated that direct reduction, even from well-established scientific principles, may involve excessive labour, with a doubtful chance of a successful issue. A sound acquaintance with the basic laws involved is none the less of first class importance, if the engineer is to venture far beyond the actual limits of his experience without risk of serious disaster. Unfortunately, the scientific analysis of practical heat transmission problems has only comparatively recently been systematically attacked, and progress is still hampered by the uncertain state of our knowledge of certain aspects of radiation and convection; for instance, the emission of radiation by hot gases or flames, and the effect of size, shape and position, upon the rate at which surfaces cool in air. The available data on this subject, however, has now been collected and analysed by Dr. Margaret Fishenden and O. A. Saunders in a book which the Department of Scientific and Industrial Research has published under the title of "The Calculation of Heat Transmission" (H. M. Stationery Office, 10s. net).

This book is of interest to engineers, technologists and students of applied science generally. Those who are concerned with heat processes, except those of the very simplest nature, know how difficult it is to get hold of reliable information, or to adapt the limited data available to their own particular problems. During the past ten or twenty years numerous papers describing specialised experimental investigations have appeared in the technical Press of the different countries, and the Fuel Research Board considered that it would be a useful work to reduce this scattered and incoherent literature to a more systematic form, to examine the best methods of correlating the available data, and to ascertain in what directions further experimental work was most urgently required. The present book is therefore the outcome of this plan. In compiling it the authors have brought together in accessible form the results of the various experimental investigations, interpreting and comparing them, so far as was feasible, in the light of the fundamental principles of radiation, conduction and convection. An attempt has been made to give a comprehensive but simple account of the available information, and to arrange it suitably for practical use. Radiation, conduction and convection are considered separately, and in a final chapter a number of selected examples, carefully chosen to cover important practical problems, show how the formula and coefficients deduced from the experimental data can be applied.

Variation in Natural Convection

So far as is possible, complicated theoretical considerations and highly specialised technical applications have been avoided, but it was thought essential to include a brief account of the fundamental physics of heat transmission. This is introduced by a simple exposition of the laws of absorption, reflection and emission, of radiation for solids and gases. In many industrial processes the time taken for heat to penetrate into a mass of material, and the temperture gradients meanwhile set up, are of vital significance. Curves are given from which these can be deduced for various surface conditions and an approximate method is described for use where exact mathematical solutions are not available. Turning to convection, the authors state that in nine cases out of ten what the technologist wants to know is how quickly a moving stream of hot gas can convey heat. Many direct measurements have been made, but these have not been generally accessible, except by reference to the original papers. One of the main objects of the book described has therefore been the correlation of the existing mass of convection data and its presentation in a form convenient for calculation purposes. It is pointed out that radiation, conduction and convection all enter into the transfer of heat across the air space between a hot surface and a parallel cooler surface. The heat transferred by radiation is independent of the width of separation, provided this remains small compared with the linear dimensions of the surfaces and an expression is given for its calculations. The heat transferred by conduction and convention is difficult to assess owing to the uncertain nature of the air movements, which depend upon the height and width of the air space, the temperatures of the surfaces, and their inclination to the vertical, as well as upon whether the hotter or colder surface is uppermost and whether the air space is closed or open at the edges. Conduction can be calculated quite simply, but is less than the actual heat transfer. except when the conditions are such that the air is restrained from moving, for example, in the case of an enclosed air layer bounded by horizontal surfaces of which the hotter is uppermost.

Early workers on natural convection studied mainly the cooling in air of bodies of a few simple shapes, expressing their results in terms of temperature difference and surface area; but they were not in a position to deduce generalisations as to the effects of size, shape, etc., from the limited material at their disposal. Frequently, indeed, only the co-efficient of total cooling was determined, no attempt being made to separate radiation and convection. Most subsequent experimental work has been done with planes and horizontal or vertical cylinders of various sizes in air, but a few investigators have studied the cooling of wire in gases. In some cases the variation of natural convection with size is very marked; for fine wires, for instance, for the same temperature difference, the heat transfer per unit area may be as much as 50 times that from cylinders of a few inches diameter. Since the rate of heat transfer per unit area by radiation is independent of size, fine wire thermocouples can be used to measure the temperature of air or gases in close proximity to surfaces at a different temperature; in such cases the readings of an ordinary mercury thermometer may be seriously affected by radiation from the neighbouring surfaces and are well-known to be unreliable.

Practical Data on Forced Convection

A number of cases of forced convection have been investigated experimentally and are discussed in the book. These include the heat transfer (1) between the external surface of a cylinder and a stream of gas or liquid flowing at right angles to its axis; (2) between the external surfaces of a number of adjacent parallel tubes, technically known as a tube-bundle, and a stream of gas flowing at right angles to their axes; (3) between the internal surface of a tube and a stream of gas or liquid flowing through the tube. Experiments have also been carried out with air streaming in a parallel direction past plane surfaces both with and without fins and past a cylinder of stream line cross section. The heat transfer between a surface and a condensing vapour is also discussed, although the experimental data is still very incomplete. When a vapour is in contact with a surface cool enough for condensation to take place, latent heat is given up by the vapour. The heat transferred to the surface, however, must pass through a film of condensate formed, the thickness of which depends upon the rate of condensation and the rapidity with which the surface can drain. The rate of heat transfer would therefore be expected to vary over a wide range with the shape, condition and arrangement of the surface, as well as with the viscosity and conductivity of the condensate, the temperatures of the surface and vapour, and the velocity of the steam over the condensing surface. The presence of even small proportion of non-condensable gases. such as air, might also modify the heat transfer to a considerable degree.

Experimental work carried out in this field has naturally been directed mainly to the important case of steam condensation. where the proportion of air present is as a rule relatively low. Under these conditions, the bombarding steam molecules can convey heat so rapidly to the surface of the condensate layer that the overall rate of heat transfer is decided mainly by the resistance to the conduction across this layer. When, on the other hand, non-condensable gases are present in considerable proportions, the rate of steam condensation may be so restricted as to become the determining factor in the overall heat transfer. At present only rough

average values can be quoted, and further carefully chosen direct measurements of the vapour to surface coefficients are needed. In many cases, however, such as in condensers, evaporators and stills, the coefficient of heat transfer at the steam side is not the controlling factor in determining the heat flow, and its value is not required with much precision in the practical calculations. Different liquids at different temperatures have widely different viscosities and, mainly for this reason, give widely different heat transfer values. The principle of similarity again is here the most convenient way of correlating the limited results available, and enables values to be given for practical use over a much greater range of conditions than so far covered by experiments.

Dr. C. H. Lander, the late director of Fuel Research, in his preface, remarks that the data collected and analysed have already been of the greatest value in the experimental work conducted at the Fuel Research Station at East Greenwich, and it is hoped that they may be equally useful to those interested in industrial processes, most of which, at one stage or another, involve problems of heat transmission.

German Foreign Chemical Trade

A Statistical Survey for the First Quarter of 1932

PROGRESSIVE depression is evident in German official chemical foreign trade figures for the first quarter of 1932. Volume exports fell 22 per cent. compared with the first three months of 1931 and imports 41 per cent. Export values were 25 per cent. off and import values 42 per cent. less. valued at 192,508,000 marks,* against imports of 446,348 tons valued at 192,508,000 marks, against imports of 446,348 tons and 43,786,000 marks—a favourable balance of 291,926 tons and 148,722,000 marks. against corresponding figures for the first quarter of 1931 of 186,496 tons and 79,997,000 marks. The drop in exports, according to an article which appeared recently in "Commerce Reports," is most evident in the case of the artificial and mineral fertilisers, especially ammonium sulphate and calcium nitrate. It is notable that exports of synthetic sodium nitrate and potassium nitrate increased greatly. In the inadequately grouped official classification of heavy chemicals, including the nitrogen carriers and potash, January-March, 1932, exports dropped 33 per cent. in value to 85,266,000 marks from the corresponding total of 127,003,000 marks in 1931. The "artificial fertiliser" group, including the prepared phosphates, only fell 37 per cent., from a value of 4,061,000 marks in the first quarter of 1931 to 2,539,000 marks in 1932. Losses in value were general throughout, but to a less marked degree, for dyes and colours, paints and varnishes, essential oils, explosives and matches and pharmaceuticals.

Exports of Nitrogen Compounds

While the usual bulk trade in exports of nitrogen carriers —ammonium sulphate, calcium nitrate (and urea) and nitrophoska—fell off, special circumstances favoured a decided increase in shipments of synthetic sodium nitrate. Combined tonnage exports of ammonium sulphate, calcium nitrate and phosphoric acid salts dropped from about 193,000 tons, valued at 40,700,000 marks, in the 1931 three months, to 122,000 tons and 23,300,000 marks in the 1932 first quarter. On the other hand, a French order (Comptoir Francais de l'Azote), placed early this year, and believed to be for current deliveries of 150,000 to 200,000 tons product (25,000 tons N upwards), advanced exports of Germany's synthetic sodium nitrate from 13,000 tons last year to almost 60,000 tons this year (three months). The Leuna and Oppau works of the German Dye Trust are reported as utilising their full sodium nitrate capacity and even to have farmed out the excess demand with this order to others of its ammonia oxidation plants, as at Hoechst, Bitterfeld and Gerthe in Westfalen.

Imports of basic slag from France (the Saar), Luxemburg and Belgium fell sharply from 505,593 tons (21,038,000 marks) to 252,045 tons (6,235,000 marks). This is the outstanding single item of sensational decline in the period. Superphosphate imports (that would ordinarily be stimulated because of basic slag shortage) fell only slightly from 74,084 tons (3,911,000 marks) to 67,761 (2,827,000 marks). The United States is not affected as Germany imports superphosphate chiefly from the Netherlands and Belgium, except this year when a 20,000 ton delivery was made by Hungary.

Potash Shipments

German potash exports increased slightly in volume from 144,928 tons in the first quarter of 1931 to 148,337 tons in the 1932 months, but decline in value 5 per cent., from 8,068,000 marks to 7,663,000 marks. Exports to the United States, which purchases kainite, 20 and 30 per cent. manure salts, but not 40 per cent., fell slightly from 51,488 tons to 49,444 tons. The export decline was even more marked in muriate, potassium sulphate and potassium magnesium sulphate than in the fertiliser grades up to 42 per cent. They fell from 87,047 tons, valued at 13,414,000 marks, to 50,650 tons and 6,519,000 marks—a drop of 50 per cent. in value, Exports of these items to the United States fell from a total of 39,307 tons to 9,557 tons.

After having achieved a remarkable showing in 1931, during which they advanced to 3,866 tons, valued at 84,421,000 marks, from 3,479 tons, valued at 78,828,000 marks, in the preceding year, German exports of prepared pharmaceuticals fell off sharply in the first quarter of the year. They amounted to 868 tons, valued at 18,162,000 marks, as compared with 950 tons, valued at 20,438,000 marks, in the corresponding quarter of the preceding year. The overwhelming bulk of Germany's pharmaceutical exports consist of prepared medicines, but whilst shipments of unprepared medicines are much smaller relatively to prepared, they nevertheless are not unimportant.

Coincident with the German Dye Trust's announcement of a "certain stability" of dyestuffs sales last year, the following official export figures for the first three months of 1932 show a volume decline of 34 per cent., from 12,380 tons of the combined classifications to 8,146 tons:—

	1931		1932	
	Tons.	Marks.	Tons.	Marks.
Aniline dyes	8,823	36,602,000	6,415	32,027,000
Alizarin	202	2,358,000	237	2,845,000
Alizarin red	299	488,000	354	499,000
Indigo	3,056	6,040,000	1,140	3,520,000
Total	12,380	45,488,000	8,146	38,891,000

Decline in Heavy Chemical Imports

The most impressive decline in imports, now restricted by effect of the emergency decrees controlling foreign exchange transfers for financing purchases and by other artificial barriers, is that of the phosphates notably, superphosphate and basic slag. "Artificial fertiliser" imports declined 63 per cent in value, from 25,318,000 marks to 9,235,000 marks. This decline did not affect American exports but imports of phosphate rock from the United States fell almost 60 per cent., from 103,218 tons in the first three months of 1931 to 41,731 tons in this year's first quarter. Heavy chemical imports declined 47 per cent., from 24,839,000 marks to 13,234,000. American trade affected by this drop included sulphur, of which imports from the United States fell almost 40 per cent., from 20,453 to 12,339 tons; borax, 18 per cent., from 1,705 tons to 1,400 tons; carbon black, 7 per cent., from 1,677 tons to 1,548 tons.

SYNTHETIC camphor manufacture in Germany is now confined to two enterprises, several other firms having discontinued this item owing to slack demand. Present annual production is estimated at slightly over 3,000 tons or over 50 per cent. less than capacity output. Total exports from Germany of 1,877 tons of synthetic camphor were recorded in 1931, compared with 2,181 tons in 1931 and 3,049 tons in 1929. Exports to the United States have declined from 1,805 tons in 1929 to 756 tons in 1931.

* Par rate of exchange £1 = 20.43 marks.

The Dead Sea Salts Concession

Activities in Palestine During 1931

THE activities of Palestine Potash, Ltd., covering the period January 1 to December 31, 1931, were reviewed in the report of the managing director (Mr. M. A. Novomeysky), which was submitted at the second annual general meeting of the company, held in London on July 15. In the absence of the Earl of Lytton, who is in Manchuria as chairman of the League of Nations Commission of Inquiry, Colonel David Lyle presided.

The total area covered with sea water has now increased from 150 acres to nearly 500 acres. Pumping operations and filling of tanks with sea brine began early in March, 1931, and proceeded uninterruptedly up to the middle of November. The quantities of carnallite (crude potash salts) produced in the period under review were up to the company's expectations. A new and improved mechanical method of harvesting was introduced. While the few thousand tons of carnallite produced in the year 1930 were harvested exclusively by hand, over 13,000 tons were harvested this year by the new mechanical method. Efforts to replace the slow method of hand harvesting applied in European and American salt works by suction dredges were already made at the end of last year. In the course of this year, after lengthy experiments, the method has been improved and has finally met with success. It is expected that in the coming season the greater part of the carnallite will be harvested by this method, thus reducing the cost of production and improving the quality of the product.

The erection of a new power house was started at the beginning of 1931 and put into operation by July. The generation of power is effected by large Diesel type motors with high tension alternators, supplied by Ruston and Hornsby, Ltd., of Lincoln. An underground transmission line of a total length of 2½ miles was laid, thus providing all the pumps and various machinery spread over the concession area with electric current.

Bromine Plant

The erection of the first small bromine plant was completed in February, 1931, and the first consignment of bromine for the English market was despatched by the aid of the same month. The purchasers expressed full satisfaction with the quality of the product. Although some difficulties were experienced in the beginning in the summer months on account of the high temperature prevailing, these were finally overcome. In view of the high content of bromine in the final liquor produced from the Dead Sea water, which is several times that of the brines in other parts of the world, this plant was able to produce up to one ton and over of refined bromine daily. The whole quantity produced throughout the year was disposed of in the British market. In view of the satisfactory results of the first year's production, the board decided to erect a second bromine plant of double the capacity. By the end of the year under review, the erection of an additional boiler supplied by John Thompson (Wolverhampton), Ltd., and forming a part of the bromine plant, was completed. At the same time, parts of the new bromine plant were arriving.

The erection of the potash factory for refining crude potash salts (carnallite produced in the pans by solar evaporation was in progress from the beginning of 1931, and by the middle of November the first test of production was made, although the housing of the machinery was not completed at the time. A few hundred tons of high-grade potash were produced by the end of the year and sold on the British market. The quality of the product proved very satisfactory and compared favourably with the potash supplied by other producers. Over 1,000 tons of common salt of good quality (which is a by-product) were also harvested and sold locally at a satisfactory profit.

Deep Sea Pumping

The water for feeding the evaporation pans last year was taken from the surface of the Dead Sea. Soundings previously made in the sea over a period of several years proved that at a certain depth there is to be found brine of higher specific gravity and increased contents of potash and bromine. By careful soundings undertaken last year, a point on the bottom of the Dead Sea, 175 ft. deep, was ascertained, at which the content of potash and bromine reaches its maximum, namely, 50 per cent. more than that from the surface. It was therefore decided to lay a permanent pipeline on the bottom of the sea to reach this point and to pump the heavy brine through the feeder canal into the evaporation pans. A steel pipeline of 30 in. diameter and 2,500 feet in length, manufactured by Stewarts and Lloyds, Ltd., of Glasgow, was laid on the bottom of the sea to reach the depth of 175 feet. The work on the laying of the pipeline and the erection of a new station capable of pumping 8,000 gallons of heavy brine per minute, was started early in April, 1931. The execution of this somewhat difficult engineering work met with various obstacles, such as the difficulty of a diver working in water so concentrated with salts and the welding of the pipes under the burning sun, but finally all these were satisfactorily overcome and by the end of November the desired anl expected water brought from the depth reached the feeder canal through the distribution pipe.

There have not been at the present stage of production any serious difficulties in transporting the goods from the Dead Sea to the ports for shipment to the world markets, nor are there likely to be any in the future. By the introduction of new large lorries run on Diesel oil for carrying the goods from the Dead Sea to Jerusalem, it was possible considerably to reduce the cost of transport, and the company is satisfied that the quantities that can be carried on this road with the new vehicles are larger than was originally anticipated. A new and satisfactory asphalted branch road 5½ miles long connecting the existing Jerusalem-Jericho Road with the Dead Sea was constructed and completed by the Government of Palestine in September, thus reducing the time of the journey by a quarter of an hour. Assistance was given by the company to the Government in constructing this road by advancing £5,000 in the form of a loan, as provided by the concession agreement. Facilities were also provided for the company by the Palestine railway authorities which make it possible for the goods to reach the Palestinian ports, Jaffa or Haifa, and the Egyptian port, Port Said, in the shortest time.

The marketing of the company's products is being effected through C. Tennant, Sons and Co., Ltd., who, by virtue of an agreement, represent the company's sales organisation.

Review of Chemical Standards

Specification for Xyloles

ONE of the functions of the Chemical Section formed in the re-organised British Standards Institution has been to take over standards previously prepared by various sections of the chemical industry, and having ensured that they are satisfactory to users and manufacturers, to issue them as British Standards. Under this scheme the standard series of specifications prepared by the National Benzole Association are being reviewed by a representative committee of the Institution.

The recent issue of B.S. Specification No. 458-1932 for xyloles forms the first of the series and provides for three grades of xylole, *viz.*, pure xylole, 3° xylole and 5° xylole. The specification includes clauses governing requirements for colour, specific gravity, freedom from water, alkali, acids, sulphuretted hydrogen, distillation range and residue on evaporation. Complete information as to the methods of testing are given in seven appendices whilst a further appendix defines in detail the type of apparatus to be used in the various tests. The methods of tests are those which after careful consideration have been prepared by the Standardisation of Tar products Test Committee. The issue of these specifications as British Standards will secure for them wide recognition and they should prove of interest both to purchasers of this material as a means of obtaining a reliable standard quality, and also to manufacturers in that it will enable them to grade their products for sale purposes. Copies of this specification (No. 458-1932) may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. post free.

Some Impressions of Copenhagen

Forthcoming British Exhibition—Denmark as Importer

FROM OUR SPECIAL CORRESPONDENT.

THE entire Danish nation is praying that the exhibition of British goods to be held at Copenhagen in September will be a triumphant success. At this season of the year in normal times the comfortable hotels of Copenhagen would have been filled almost exclusively by tourists, English and Americans predominating, with Germans a good third. During my stay in the Early days of July there was a pronounced scarcity of holiday-makers, and their places were partially filled by the advance guards of the British trade push. Copenhagen has special reasons for rejoicing at the prospect of an influx in the early autumn of British visitors, who have the additional attraction of bringing trade in their train.

There could be no more opportune moment for the British Exhibition, for the conditions in which it will be held will be more favourable to the general interests of the two countries than at any other time in living memory. Two facts of the highest importance stand out. The first is that Great Britain is Denmark's best customer for her agricultural produce, and the second is that Denmark imports every year goods of a larger value per head of the population than any other country in Europe.

Recent developments of Imperial policy in Great Britain have aroused some natural anxiety among the Danish farmers about the continuance of their export trade to Great Britain on the gigantic scale of the last few years. The Danes recognise that for some time the balance of trade between the two countries has been in Denmark's favour, although they realise that it is not in their permanent interest that the disparity in their favour should be maintained. They have quite clearly come to the conclusion that, if there is to be in future an unrestricted flow of their farm produce into Great Britain, it must be accompanied by a great increase in their purchases of British manufactured goods.

Great Britain's Advantage

The competition of the chief exporting countries for the highly prized trade of Denmark has grown fiercer since the war. The Germans held a commanding advantage during the war by reason of their close proximity and of their secure land communications. They have put every ounce of effort into consolidating and even improving their position since the war. The Americans are represented in exceptional strength in the motor-car trade, as indeed they are in all the northern countries of Europe. To-day, however, Germany and the United States are still on the gold standard. Denmark is not. She took the earliest opportunity in the crisis of last autumn, along with Norway and Sweden, of abandoning the gold standard and linking her currency with sterling. This is a vital factor in the trading developments of this changing period. Great Britain has an enormous advantage over its chief trade rivals and has been given what is virtully an open door to the whole of Scandinavia. That is the position which, with the goodwill of the entire business community of Denmark, the exhibitors from our own country will seek to exploit on the Copenhagen fair-ground in September.

It may be hoped that the Exhibition will be at least as widely representative of British manufacturing industry as was that which the Prince of Wales went specially to Buenos Aires to open in the spring of 1931. The Danes are certainly expecting a really big show. They have placed at the disposal of the British authorities the Tivoli, the great pleasure park of the capital, the Industries Hall and the Forum, in which they usually hold their own motor-car shows. I heard, while in Copenhagen, of many British firms which had already taken space at the Exhibition and of many more which were still making inquiries. Those who are wavering can be recommended without hesitation to come in, as such an opportunity for doing business in Scandinavia is not likely to recur for a long time.

Denmark complains that it is having to bear its share of the world depression. Still, it has not been so badly hit as some of the larger European countries. It is a clean looking country, and, apart from Copenhagen, has hardly any industrial problems. There seems to be a widespread impression among those who have not visited the country that it is flat and bare, like the greater part of Holland. This is a complete misconception. There are certainly no mountains, but the mainland as well as the islands are pleasantly undulating and there are considerable belts of forest land. Whereas in Swedish woodlands one sees little but birch and fir, the beech is the national tree of Denmark. Nothing could be more pleasant or refreshing to the English visitor who takes a pride in his own countryside than to drive along the excellent Danish roads through beech woods here and there, with occasional glimpses of well-tilled fields and of small white farms that spell comfort and contentment.

From every point of view a visit to Denmark this autumn cannot fail to be of advantage to the British business man. There are a great many orders to be got, more particularly by those firms which study the special requirements of the Danes. There is further a nation to be visited and understood in order to make the economic bonds between the two countries as strong as possible in the future. It is a hospitable race, and the closer association which the exhibition will bring about between the two peoples should greatly influence the re-orientation of world trade which the present distresses are bringing about.

G.R.

Modern Water Softening

Interesting Plants at Northampton and Bletchley

THE sixteen large lime and soda ash water-softening plants, with an aggregate capacity of over 6,000,000 gallons per 24 hours, which are now being completed for the London, Midland and Scottish Railway by the Paterson Engineering Co., Ltd., of London, represent the latest scientific principles of lime and soda ash water-softening practice. The plant at Bletchley has a vertical cylindrical reagent tank 30 ft. high by 25 ft. diameter, equivalent to six hours' settling, a highly important point for water of high-magnesium content, the capacity being 12,000 gallons of pure softened water per hour. This plant is operated entirely from the ground, including the mixing of the lime and soda ash reagents, which are injected by a specially designed pump operated in step with the softened water delivery pump. Separate closed pressure sand filters are used, the installation consisting of two standard "Paterson" filters of the vertical type, 8 ft. diameter, with a filtering surface of 100 square feet, operating at full load at 120 gallons per sq. foot per hour.

The use of closed sand pressure filters removes the last traces of suspended material from the softened water, thus avoiding self-contained wood wool filters, the result being absolutely clear water, equal to town supply. The filters are cleaned by means of compressed air agitation and a momentary reversal of the water flow to sweep away the disentangled impurities, the same sand lasting for years. The lime storage container holds an 18-hour charge of solution, while included in the equipment at Bletchley is an apparatus for adding traces of sulphate of alumina to assist chemical treatment, and an electrically-driven centrifugal pump for delivering the softened water into the elevated locomotive supply tank. The sludge is discharged direct into railway wagons, and the whole of the chemical supply gear, filters, air cleansing machinery and other accessories are housed in a brick building measuring 35 ft. by 18 ft.

At Northampton the reaction tank is 29 ft. high by 27 ft. diameter, equivalent to six hours' settling, with a capacity of 15,000 gallons of water per hour. As at Bletchley, the chemical gear is of the ground-controlled pump-injection type, operated in step with the softened water delivery pump, while there is included the use of sulphate of alumina. The two closed pressure sand filters, however, are of the horizontal cylindrical type, 8 ft. long by 8 ft. diameter, with compressed air cleaning as usual, but the sludge is passed through filter presses fitted on the elevated gantry over the railway track, being delivered for transit in the form of hard cakes.

Some Programmes at the Fuel Research Station

By F. S. SINNATT, D.Sc., F.I.C.

The present position of certain of the major programmes which are in progress at the Fuel Research Station, East Greenwich, is briefly outlined in this article, which is taken from the 1932 issue of the Federation of British Industries' "Fuel Economy Review."

IN low temperature carbonisation, the difficulties which have been experienced from the distortion which occurs when cast iron retorts are used for temperatures above 620° C., have already been stressed by Dr. C. H. Lander. As a result of the experience with externally heated metal retorts at the Fuel Research Station it was therefore decided to try a retort built of ordinary firebrick, although it had previously been thought that undue leakage of gas and tar would occur with brick retorts. Such a retort was erected in November, 1930, but no appreciable loss of tar has occurred. During the course of the experiments several types of coal have been carbonised. With medium caking coals 10 tons have been treated per day, while with highly caking coals 6.5 tons have been carbonised. Experiments have also been carried out with fine caking coal, and 5 tons a day have been treated, but not with very marked success. But a blend of caking coal (70 per cent.) and non-caking (30 per cent.) has been very successfully treated at 5.6 tons per day. With the knowledge gained in the experiments it is becoming less difficult to establish suitable conditions for any new type of coal, and experiments have been carried out with both continuous and semi-intermittent working. It has been possible with the brick retort to raise the temperature above that possible with cast-iron retorts, and trials have been carried out in which the coal has been carbonised at from 700 to 900° C. It has been found that coke produced at about 700° C. has similar properties to that obtained at about 620° C. as regards the ease with which a fire can be made in an open grate, and the experiments in progress aim at relating the properties of the coke in this respect with the temperature of carbonisation. The tars produced at these intermediate temperatures are being examined, particular attention being paid to their properties in relation to hydrogenation. It has been found that certain coals yield tars which are not readily amenable to hydrogenation when temperatures up to 800° C. are used, whereas the tar from other coals can be readily hydrogenated up to this temperature of carbonisation.

Pulverised Fuel

One of the methods of burning pulverised fuel to produce a short flame is to subject the particles to some controlled force by which the air for combustion is made to travel past the particles. This principle is employed in the vortex combustion chamber, first suggested by Dr. C. H. Lander. In this the air travels from the circumference to the centre of a cylindrical chamber, and a vortex motion is established. The dimensions are such that the action of centrifugal force upon the fuel particles is balanced by the opposing force due to the inward motion of the air. The effect obtained is thus equivalent to a stationary cylindrical fuel bed through which air travels radially from the outside to the centre. Experimental work, which has been supported by mathematical analyses, demonstrates the practicability of this method, and experimental burners have been made at the Fuel Research Station which indicate that the development of a burner is possible.

This method of treatment has certain features which may be of some value; thus it is clear that the larger particles will take up a position more remote from the point of exit. This effect provides a means by which inequalities in the grinding of the coal can be compensated for. It is possible by adjusting the air supply to make the burner operate as a producer, and in this case the temperature inside the burner may be maintained at such a figure that the brickwork cannot be affected and the coal ash will not fuse. The results obtained by this method of working showed good agreement with those predicted from theoretical considerations, and it has been found possible to operate at the designed capacity, making producer gas.

A second burner, the "grid" burner, the design being due to Mr. Hurley, has been developed, which resembles in some ways a number of Continental burners. The principle involved consists in dividing the primary air, in which the fuel is suspended, into a number of thin parallel streams somewhat in the manner employed in the well-known Meker gas burner. In the burner under consideration the process is elaborated, and the thin streams of preheated secondary air are introduced in alternate layers with the air carrying the fuel. It has been found possible, with a burner having an area of 9 in. by 9 in., to burn from 400-1,400 lb. of coal per hour, the maximum length of flame being about 11 ft. This burner has been applied to a tubular boiler.

Hydrogenation of Coal

The hydrogenation of coal has been considered at the Fuel Research Station from several aspects. In the first, an attempt has been made to trace the influence of progressive hydrogenation, it having been shown that when coal is partially hydrogenated one of the results is to convert a non-caking coal into a highly caking material. This change can be brought about by the addition of 0.3 per cent. of hydrogen, and with increase in the amount of hydrogen reacting there is an increase in the caking properties of the product until finally substantially the whole of the coal is converted into a liquid product and gas. The second aspect of the problem has been a study of the conversion of the coal into liquid products, and particularly an examination of the effect of the addition of various substances with a view to using them as catalysts. It has been found that very small proportions of certain inorganic substances increase the rate of hydrogenation. Amongst the most effective compounds are zinc compounds and tin compounds. It has been usual to mix the coal with a vehicle prior to hydrogenation, and experiments have been carried out at the Fuel Research Station in which the coal has been exposed to the action of a rapid stream of hydrogen in the presence of a catalyst, but in the absence of a vehicle. By this treatment the coal has been converted into a product which is different from that obtained when a vehicle is present, and contains a high proportion of low boiling constituents. By treatment of this product with other catalysts it has been found possible to obtain a yield of 125 gal. of spirit, of boiling point up to 230° C., per ton of coal.

Low Temperature Tar and Motor Spirit

In addition to the work which has been carried out upon the hydrogenation of coal, attention has been paid to the hydrogenation of low temperature tar and to the products from high temperature tar. It was thought that any processes for the conversion of low temperature tar into motor spirit might assist in the solution of the general problem of low temperature carbonisation, since it might provide an alternate market for one of the major by-products.

The technique and apparatus employed for the early experiments upon the hydrogenation of tar were based upon those used for coal. It was necessary to provide catalysts which were suitable for the treatment of the tar, and a large number of compounds have been investigated. Some have been found to be suitable for use in a continuous plant. The chief reactions occur at temperatures between 400° and 500° C. and certain compounds were found to inhibit the hydrogenation of tar, *e.g.*, calcium oxide. Others were more suitable for the hydrogenation of tar acids into neutral oil, and others convert the pitch-like constituents present in low-temperature tar into neutral oil. Experiments have shown that crude low-temperature tar as delivered from the low-temperature carbonisation retort containing from 2 to 4 per cent. of water can be treated successfully, and thus it is not necessary for it to undergo any preliminary distillation. One catalyst which has been used for this treatment is ammonium molybdate supported on active charcoal. So far as the experiments have gone it appears that in the presence of this catalyst at 200 atmospheres the volume of oil produced is equal to that of the tar, although obviously its specific gravity is lower. By this method of treatment from 20 gal. of tar 14 gal. of neutral oil, boiling below 230° C., and 6 gal. of oil free from pitch have been obtained. The heavier oil is suitable for use in Diesel engines, but by treatment it is possible to convert a proportion of it into motor spirit. The volume of gas produced is relatively small.

Letters to the Editor

Old Chelsea Students

SIR,—A number of old students of Chelsea Polytechnic (formerly the South Western Polytechnic Institute) have expressed a desire to form an association which will bring them into intimate touch with the present members of the Polytechnic and at the same time provide them with contact, through the Polytechnic Magazine, with their associates in the world of science, art, industry and commerce. A Chelsea Polytechnic Old Students' Association is to be inaugurated at a meeting to be held on November 4 next, on the occasion of the opening of the Polytechnic extension by the Parliamentary Secretary to the Board of Education, Mr. H. Ramsbotham, M.P. It is hoped that as many old students as possible will attend, and the object of this letter is to inform students who could not otherwise be notified.

Old students wishing to be present at the meeting, or who desire particulars of the Association should address communications to the hon. secretary, Chelsea Polytechnic Old Students' Association, Manresa Road, Chelsea, S.W.3.—Yours faithfully,

C. H. ST. J. HORNBY,
Chairman of the Governors.

Manresa Road,
Chelsea, S.W.3.

Liquid Oxygen Patent Dispute

Continuation of Hearing

IN the Chancery Division this week, Mr. Justice Luxmore continued the hearing of the case of Aktiengesellschaft Fur Industrie-Gasverwertung against the British Oxygen Co., Ltd., in which the plaintiffs, a German company, had discontinued their action against defendants for alleged infringement of patent, and which now proceeded on a counterclaim by the British Oxygen Co. for the revocation of plaintiffs' two letters patent, No. 149,233 for improved method and means of storage, transporting and delivery for use gas under pressure from liquefied gases, and No. 279,041 for an apparatus for preparing compressed gases.

The case for the plaintiffs was given in THE CHEMICAL AGE, July 16, page 57.

Mr. WHITEHEAD, K.C., for the British Oxygen Co., submitted that there had been anticipation and want of subject matter. Claim one was a claim for a mere scheme and was not a claim for a manner of manufacture. Moreover a monopoly was claimed and for that reason the claim was not proper subject matter for a grant of letters patent. Proceeding, counsel dealt in detail with the claims of the first patent to support his case that the patent was ambiguous and was invalid by anticipation and lack of subject matter.

With regard to the combination of pressure vessel with rectification vessel counsel submitted that the pressure vessel claimed was old and so was its characteristic of a thin wall, and that there was no invention in the combination. Lord Justice Scrutton had said that before a patent could be considered, there must be substantial exercise of the inventive faculty.

Mr. Alexander-Gill, chartered patent agent and consulting engineer, gave evidence for the defendants.

United States Imports of Ethers and Esters

IMPORTS of ethyl aceto-acetate during the first quarter, shown separately for the first time in 1932, amounted to 21,958 lb. This commodity was formerly included under "ethers and esters, n.s.p.f." A recent analysis of this latter group showed the inclusion during 1931 of the following: Ethyl aceto-acetate, 101,475 lb.; methyl acetate, 9,039 lb.; ethyl laurate, 704 lb.; butyl phosphate, 2,240 lb.; and also small quantities of acetyl chloride, sebacic ether, diacetin, amyl valerate, silicon esters, ethyl ester of tartaric acid, ester gum, vinyl acetate and linoleic acid. During 1931 Germany was by far the most important country of origin for imports in this group, with small quantities coming from the Netherlands, France, Switzerland and the United Kingdom.

Chilean Nitrate Situation

Terms for Agreement

THREE points which Chile stipulates must be included in any agreement with the synthetic nitrate producers have now been outlined by Senor Enrique Zanartu, the Chilean Minister of Finance. Chile is to have the right to sell in the competitive market even in those countries producing enough synthetic nitrate to supply their own needs. In the event of an increase in world consumption above the quantity on which production quotas have been based, Cosach, in addition to its annual minimum quota, shall be allowed an increase of 25.5 per cent. Synthetic nitrate producers are also to increase the price of nitrate lime to within 2.5 per cent. of the price of Chilean nitrate. Senor Zanartu declares that all nitrate prices should first be agreed upon, but in the event of the synthetic producers not increasing their prices within a reasonable time Cosach would have the right voluntarily to reduce prices to a competitive basis.

A brief announcement on the nitrate negotiations which have been progressing intensively in London for the last few days, was issued in Berlin on Wednesday, July 20. This announcement was to the effect that "negotiations between the European and Chilean nitrate interests in London have been concluded, and it has been possible to arrive at an agreement for the basis of an understanding." After the conclusion of the conference, the German delegates left immediately to return to Germany. They issued no further explanation of the studiously vague general announcement quoted above, nor was it possible to get more than the promise of an announcement from Imperial Chemical Industries, Ltd., who were the British participants in the conference. During last week an agreement was reached among the principal European producers, including England, Germany, France, Italy, Belgium, Holland, Norway, Czechoslovakia and Poland. This agreement only covered sales quotas, which, it is believed, are based approximately on the current situation as it stands. No general price agreement was reached, but it is thought that the arrangement with Chile may allow some fixed cartel price to be established.

Chemical and Wood Industries

Winding-Up Proposed

AN extraordinary meeting of Chemical and Wood Industries, Ltd., will be held at Winchester House, on July 27, at noon, to consider voluntary winding-up. A circular issued to the shareholders states that the operations of the Destilacija Co., in Yugoslavia, the company's subsidiary, are resulting in heavy losses, the depression having specially affected the particular industries in which it is concerned. In the circumstances the directors consider immediate voluntary liquidation to be in the interests of the shareholders. A provisional contract has been entered into to sell the 77,642 shares of 200 dinars each in the Destilacija Co. which the company holds for £38,821 to the First Croatian Savings Bank, and to release it and the Destilacija Co. from all claims in respect of the £17,528 deposited as security for the liabilities of the subsidiary to the bank. The directors are of opinion that no other possible market could be found for the shares in the Destilacija Co.

Chemical Imports

Further Additions to the Free List

THE Import Duties (Exemptions) (No. 2) Order, 1932, issued on July 12, adds the following article to the free list under the Import Duties Act, 1932:—

Glycol ethers and glycol ester-esters. These solvents are used in the manufacture of cellulose enamels, lacquers, varnishes, etc.

Bromine.—Used in the manfuacture of bromides, which are of importance in the dyestuff industry, photography and medicine, otherwise in the manufacture of organic chemicals.

Boron minerals and concentrates.—These raw materials are largely used in the manufacture of borax and boric acid.

Natural (but not turpeneless essential oils) the following:—Aniseed, bois de rose, brown camphor, bergamot, geranium, lavender, lemon and peppermint. These are used mainly in perfumery and pharmacy and for flavouring.

News from the Allied Industries

China Clay

EXPORTS OF CHINA CLAY from the United Kingdom during June totalled 28,692 tons, valued at £43,200, as compared with 37,098 tons, valued at £63,615 in June, 1931.

Mineral Oil

PROGRESS APPEARS TO HAVE BEEN MADE at the International Oil Conference which opened in Paris nearly three weeks ago. At the close of the meeting on Monday the delegates declared that the consideration of the general aspects of the problem had been completed, and that negotiations were continuing with a view to drafting a text reconciling the views expressed on several questions of detail. The present talks follow the unsuccessful discussions in New York which failed owing to the Russian delegates rejecting certain terms offered to them. It was hoped when the conference met that the British and American delegates would come to an agreement first with the Roumanians on the limitation of output, checking of dumping, and price-cutting. The question of a common attitude toward Russia was then to be discussed.

Tanning Industry

THE REPTILE TANNING and dressing season is again in full swing. This industry is of quite recent development and was only introduced into this country about five or six years ago. Previous to that time, the finest reptile tannages were produced on the Continent. It is now claimed that some productions in this country are equal to them even if they do not surpass them. Large quantities of black and white lizards, pythons and other snakeskins are in process. Synthetic tannins of all kinds are finding an ever increasing use for this purpose and in some cases bleaching agents are used in order to modify the shading on some of the skins. It is reported that a tannery at Salisbury has been leased to a German syndicate for the purpose of tanning and dressing reptiles, so that they evidently have confidence in the future possibilities of this new branch of leather manufacture.

Vegetable Oil

THE WORLD'S CONSUMPTION of vegetable oils has increased so enormously in the past twenty years, and their production plays such an important part in the economic life of the Empire, that the Empire Marketing Board is preparing a series of world surveys dealing with their production and trade for the assistance of the many industries interested. The first volume of the series, dealing with the products of the oil palm—palm kernels, palm kernel oil and palm oil—has just been published (H.M. Stationery Office, 1s. net). More than half the palm kernels and palm oil entering world trade are furnished by the British West African Colonies—Nigeria, Sierra Leone, the Gold Coast and Gambia—and the United Kingdom is the world's second largest consumer of palm kernel oil and palm oil. The second volume, dealing with the products of the coconut palm—copra, coconut oil, desiccated coconut, coconuts, copra, cake and coir—will be ready shortly.

Sugar

OWING TO RECENT DEVELOPMENTS within the body of the United Java Sugar Producers' Association, dissolution by the end of the year is considered likely. It is probable that a new organisation will be formed. The Netherlands Department of the Colonies is reported to be working out plans to prevent the complete decentralisation of the Java sugar industry.

THE INTERNATIONAL SUGAR CONFERENCE, at Ostend, closed on July 16. No final decision was reached on the Cuban demands and the Cuban delegates will return home to discuss with the proper authorities the suggestions made to them. These suggestions are that for 1932 Cuba should receive in regard to exports to other places than the United States the quota of 805,000 tons provided for by the Chadbourne Plan, plus 115,000 tons in respect of the German export deficit, and 65,000 tons as extra quota. For 1933 the Cuban quota would be the 856,000 tons provided for by the Chadbourne Plan, plus 100,000 tons in respect of the German deficit, and 65,000 tons as extra amount. These suggestions are not formal proposals, but are to be considered only as a basis for negotiation.

Non-Ferrous Metals

PESSIMISM IN COPPER became more pronounced this week when there was a further fall in official quotations of electrolytic to the new low record of £28 10s. to £29. The decline averaged 15s. per ton. This clearly indicates the increased efforts made by producing interests outside the Copper Exporters' Association to secure orders from consumers.

Matches

SINCE THE FORMATION of the British Protective Committee watching the Kreuger concerns, changes have been made in its constitution. The present members are:—Sir Arthur Worley, chairman (British Insurance Association); Mr. Hildred Carlisle (Investment Trust Corporation); Mr. H. F. Chamen (Kitchen, Baker, Mason and Co.); Mr. T. Gilbert Scott (Laing and Cruickshank); Mr. L. A. Stride (Industrial and General Trust). The secretary of the committee is Mr. George Starkey, 61 Threadneedle Street, E.C.2.

Bleaching and Dyeing

DELEGATES TO THE HALF-YEARLY MEETING of the Bolton Amalgamation of Operative Bleachers, Dyers and Finishers, which has a membership of 20,000, has unanimously approved the formation of the new federation of unions in the bleaching, dyeing, finishing, and calico printing trades, which was decided upon in June. Other organisations concerned are the Amalgamated Society of Dyers, Bleachers and Finishers, the National Union of Textile Workers, the Calender Men's Society and a section of the National Union of General and Municipal Workers. The new Federation will operate in Lancashire, Yorkshire, Cheshire, Derbyshire, and some parts of Scotland, and will be representative of between 70,000 and 80,000 workers in the bleaching industry. Mr. E. W. Hargreaves, of Chorley, was elected general president of the Bolton Amalgamation.

Iron and Steel

TRADERS FROM THE NORTH-WEST brought cheering reports of improving business to the quarterly market at Birmingham on July 14. Further testimony to the same effect was borne by representatives of the heavy engineering industries of the North-east, where some substantial contracts have been placed lately. South Wales trades were less prominent in buying and selling than usual. It is stated that the tinplate works are operating at only 45 per cent. of capacity. This may be an earnest of the manufacturers' determination to recover control through restriction of supply. Mills rolling structural steel, however, are working only intermittently. Hopes are entertained that between now and the next quarter-day the good seed sown at Lausanne and that which is about to be sown at Ottawa will fructify, and that the autumn trade will have propitious conditions in which to thrive. The opening of the third quarter leaves market values where they were, but the view generally held is that prices of iron and steel are more likely to decline than to advance.

Rubber

THERE WAS ANOTHER DECLINE in United Kingdom stocks of raw rubber last week, the reduction amounting to 1,574 tons at 106,949 tons. This total is nearly 30,000 tons lower than in the corresponding week of last year.

THE GOVERNMENT STATISTICAL OFFICE at Batavia, Dutch East Indies, announces that according to figures available up to July 14, 24 per cent. of the total available area of rubber was not being tapped apart from the periodical tap. The figures for January, February, March and April showed that the percentage untapped was 10, 12, 13 and 18 respectively. An aggregate of 383 estates had entirely discontinued tapping up to last May.

THE BURMA GOVERNMENT has drawn up more favourable conditions to ease the position of rubber plantations. The new regulations allow of the suspension of land revenue subject to the planter undertaking to pay the sum due plus 6¼ per cent. simple interest annually. Under the previous arrangement, the suspension was subject to agreement by the planter to have his grant rectified so as to permit the enhancement of land revenue by 100 per cent. instead of 50 per cent. at each revision.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

BUSINESS during the current week has been fairly satisfactory, there being little change indicated in any of the quoted prices. Owing to shortage in production the coal tar products market remains firm, but there is no alteration in prices. Owing to the Glasgow Fair holidays, no report has been issued this week regarding the Scottish chemical market. Chemical products generally have maintained a steady to firm front on the Manchester market during the past week, although one or two recessions have to be noted compared with a week ago. Apart from seasonal interruptions of contract deliveries in consequence of the holidays, there is a not unsatisfactory movement of chemicals into consumption in the district, although the bulk of new business, as before, is confined to relatively near delivery positions.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID, CITRIC.—1s. 0½d. per lb. LONDON: 1s. 1d., less 5%. MANCHESTER: 1s. 0½d.

ACID, CRESYLIC.—97 99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID, FORMIC.—LONDON: £48 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £20 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £45 10s. per ton in casks, £48 10s. to £52 10s. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £47 to £48, ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. 0½d. per lb. SCOTLAND: B.P. crystals, 1s. 1d. to 1s. 1½d., less 5% carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton, carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £26 10s. f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £26 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 to £11 10s. per ton.

BISULPHITE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 10s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, powder £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4⅛d. to 5⅝d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3⅜d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r., or ex works.

CREAM OF TARTAR.—LONDON: £5 to £5 3s. 6d. per cwt.

FORMALDEHYDE.—LONDON: £28 to £30 per ton. SCOTLAND: 40%, £28 10s. ex store.

HYDROGEN PEROXIDE.—10s. per lb.

LAMPBLACK.—£46 to £50 per ton.

LEAD, ACETATE.—LONDON: White, £36 to £37 per ton. Brown £1 per ton less. SCOTLAND: White Crystals £40 to £41 c.i.f. U.K. ports. Brown £1 per ton less. MANCHESTER: White, £34; Brown, £32.

LEAD NITRATE.—£28 per ton. MANCHESTER: £27 10s.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £19 to £21 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£38 per ton d/d.

NICKEL SULPHATE.—£38 per ton d/d.

PHENOL.—Small lots 6¼d. to 6½d. per lb. in 3-cwt. drums, bulk quantities down to 5½d. per lb., delivery free U.K.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5⅜d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £30.

POTASSIUM CHLORATE.—3⅜d. per lb. export London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99½/100% powder, £34. MANCHESTER: £36.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8½d.; B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99% £17 10s. in drums, £18 15s. in casks. Solid 76/77% £14 10s. in drums 70/72% £14 12s. 6d. carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 contracts.

SODA CRYSTALS.—Spot £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2⅞d. per lb. LONDON: £29 per ton. MANCHESTER: £29.

SODIUM CHROMATE.—3⅛d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 to £15 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.
SULPHUR.—£12 5s. per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 5s. to 5s. 3d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.—1s. 0¾d. per lb.
ACID, TANNIC, B.P.—3s. 2d. to 3s. 6d. per lb.
ACID, TARTARIC.—1s. 0¾d. per lb.
ASPIRIN.—2s. 7d. to 3s. per lb., including packing and delivery.
IODINE, RESUB., B.P.—20s. 8d. to 26s. per lb.
IODOFORM B.P.—23s. 9d. to 29s. 3d. per lb.
METHYL SALICYLATE.—1s. 4½d. to 1s. 6½d. per lb., including bulk packing and delivery.
POTASSIUM IODIDE, B.P.—17s. 10d. to 21s. 7d. per lb.
QUININE SULPHATE.—2s. 4d. per oz.
SODIUM IODIDE.—19s. 4d. to 23s. 9d. per lb.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 5d., including packing and delivery; Crystal, 1s. per lb. more.
SACCHARIN.—37s. 6d. per lb. deliverey free, packing inclusive, duty paid, subject to usual scale of rebates.
VANILLIN.—Ex Clove Oil, 16s. to 18s. per lb.; ex Guaiacol, 14s. 3d. to 16s. 3d. per lb., including packing and delivery free U.K.

Intermediates and Dyes

IN the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL.—34.5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
a-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
B-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.
a-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 9d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6¾d. per lb. Crude, 60's 1s. 5¼d. to 1s. 6¼d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 2s. to 2s. 2d.; Refined, 1s. 9d. to 1s. 11d.; Pale, 98%, 1s. 6d. to 1s. 7d.; Dark, 1s. 4d. to 1s. 4½d. LONDON: 98/100%, 1s. 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude 7d. to 7½d. per gal. Standard motor, 1s. 2d. to 1s. 3d.; 90%, 1s. 3d. to 1s. 4d. Pure, 1s. 6d. to 1s. 7d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motor, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3¼d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3¾d. to 4¾d. SCOTLAND: Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 5d. per gal.; 95/160, 1s. 4½d.; 90/190, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 1s. 1d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
TOLUOL.—90%, 2s. 2d. per gal.; Pure, 2s. 6d.
XYLOL.—1s. 9d. per gal.; Pure, 1s. 11d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 per ton. Grey, £11 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £8; grey, £11 10s.
ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £18 per ton.
ACETONE.—£63 to £65 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£7 10s. to £12 per ton.
IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.
WOOD CREOSOTE.—1s. to 2s. 6d. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.
BROWN SUGAR OF LEAD.—£32 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—During the week some export markets have been firmer and prices have slightly advanced. There has been no change in the Far East markets, however, where business remains dull. Further substantial quantities have been booked for the coming season's home delivery at £5 5s. per ton delivered nearest station in 6-ton lots.

NITRATE OF SODA.—The price remains unchanged at £9 for imported and £8 16s. per ton for British, delivered in 6-ton lots.

NITRO-CHALK.—The price remains unchanged at £7 5s. per ton delivered in 6-ton lots.

Latest Oil Prices

LONDON, July 20.—LINSEED OIL was dearer. Spot, small quantities, £16; July, £12 12s. 6d.; Sept.-Dec., £13 2s. 6d.; Jan.-April, £14 per ton, naked. RAPE OIL was steady. Crude extracted, £28; technical refined, £30 per ton, naked, ex wharf. COTTON OIL was firm. Egyptian crude, £20 10s.; refined common edible, £24 5s.; and deodorised, £26 10s. per ton, naked, ex mill. TURPENTINE was unchanged. American, spot, 50s. 1d. per cwt.

HULL.—LINSEED OIL, spot, closed at £12 15s. per ton; July and August, £12 2s. 6d.; Sept.-Dec., £12 10s.; Jan.-April, £13 5s. COTTON OIL, Egyptian, crude, spot, £21 5s.; edible, refined, spot, £23 10s.; technical, spot, £23 10s.; deodorised, £24 15s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £22 10s., naked. GROUNDNUT OIL, crushed/extracted, spot, £31 10s.; deodorised, £35 10s.. RAPE OIL, crushed+extracted, spot, £27; refined, £28 10s.. SOYA OIL, crushed/extracted, spot, £20 10s.; deodorised, £23 10s. per ton. COD OIL, 16s. per cwt. TURPENTINE, American, spot, 61s. 9d. per cwt. CASTOR OIL, pharmacy, spot, 41s. 6d.; first, 36s. 6d.; second, 31s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Com plete Specification.

Specifications Accepted with Date of Application

MANUFACTURE AND PRODUCTION OF FERTILISERS. J. Y. Johnson (*I.G. Farbenindustrie*). Jan. 30, 1931. 376,247.

MANUFACTURE OF DEXTRINS, SUGARS, AND OTHER PRODUCTS FROM CELLULOSIC MATERIALS. H. Dreyfus. Mar. 7, 1931. 376-322-3.

MANUFACTURE OF EMULSIONS. Distillers Co., Ltd., and H. Langwell. Mar. 23, 1931. 376,252.

MANUFACTURE OF SOAP. K. Loffl. Mar. 27, 1931. 376,287.

DRYING OF MATERIALS BY SPRAYING. K. Loffl. Mar. 27, 1931. 376,288.

MANUFACTURE AND PRODUCTION OF SHAPED MASSES. J. Y. Johnson (*I. G. Farbenindustrie*). Mar. 27, 1931. 376,276.

OXIDATION OF ETHYLENIC COMPOUNDS. Imperial Chemical Industries, Ltd., and H. L. Riley. Apr. 8, 1931. 376,306.

PREPARATION OF STABLE DIAZO COMPOUNDS. Imperial Chemical Industries, Ltd., A. Davidson and W. G. Reid. Apr. 8, 1931. 376,307.

MANUFACTURE OF PETROL- AND WATER-RESISTING GREASES. Shell-Mex, Ltd., and D. A. Yonge. Apr. 8, 1931. 376,310.

PROCESS FOR THE MANUFACTURE OF NEUTRAL SOLUTIONS OF COMPLEX METALLIC COMPOUNDS SUITABLE FOR INJECTION. A. Carpmael (*I. G. Farbenindustrie*). Apr. 9, 1931. 376,346.

CATALATIC MANUFACTURE AND PRODUCTION OF GASES CONTAINING HYDROGEN AND THE PREPARATION OF CATALYSTS THEREFOR. J. Y. Johnson (*I. G. Farbenindustrie*). Apr. 10, 1931. 376,358.

REMOVAL OF DUST AND SULPHUR COMPOUNDS FROM FLUE GASES BY WASHING. G. H. C. Corner, J. McGinn, and Imperial Chemical Industries, Ltd. Apr. 14, 1931. 376,383.

PRODUCTION OF ALKALI CYANAMIDES. J. Margoles. Apr. 17, 1930. 376,392.

APPARATUS FOR THE MANUFACTURE AND PRODUCTION OF NON-KNOCKING MOTOR FUELS AND VERY VISCOUS OILS FROM PARAFFIN HYDROCARBONS. J. Y. Johnson (*I. G. Farbenindustrie*) Apr. 20, 1931. 376,397.

PRODUCTION OF AMMONIA OR AMMONIUM SALTS, SODA, CAUSTIC, AND TAR, OR OIL FROM COMMON SALT AND COAL. A. Mentzel. May 19, 1930. 376,426.

METHOD OF EVAPORATING LIQUIDS. Industrikemiska Aktie-Bolaget. May 22, 1930. 376,430.

PRODUCTION OF MASSES, WHICH ARE PERVIOUS TO LIQUIDS AND GASES, FROM RUBBER AND THE LIKE SUBSTANCES. Metallges, A.-G. May 26, 1930. 376,432.

MANUFACTURE OF DISAZO-DYESTUFFS. I. G. Farbenindustrie. May 28, 1930. 376,438.

DISTILLATION AND CRACKING OF TAR, TAR OILS, AND THE LIKE. K. Cox and A. E. Waters. June 5, 1931. 376,449.

MANUFACTURE OF 1-META-HYDROXY PHENYL-2-AMINOPROPANOL-1. I. G. Farbenindustrie. June 13, 1930. 376,457.

RESINOUS POLYMERISATION PRODUCTS. I. G. Farbenindustrie. June 25, 1930. 376,479.

MANUFACTURE OF RESINOUS POLYMERISATION PRODUCTS. I. G. Farbenindustrie. July 26, 1930. 376,481.

PRODUCTION OF PURE PHENOL AND ALSO OF CRESOLS AND BENZOL-HYDROCARBONS FROM PHENOLS OF TAR DERIVED FROM LOW-TEMPERATURE CARBONISATION. Oberschlesischer Berg-und Huttenmannischers Verein E. V. July 22, 1930. 376,509.

PROCESS FOR MANUFACTURING A COLLOIDAL CARBOHYDRATE. T. Miyaguchi and M. Fukui. Mar. 2, 1931. 376,533.

TREATING ZINC-OXIDE-CONTAINING MATERIALS. Dr. C. Padberg. Sept. 12, 1930. 376,544.

PROCESS OF AND APPARATUS FOR THE CONCENTRATION OF NITRIC ACID. Appareils et Evaporateurs Kestner. Nov. 4, 1930. 376,583.

PROCESS FOR AFTER-TREATING CUPRAMMONIUM SILK SPUN BY THE STRETCH-SPINNING PROCESS. British Bemberg, Ltd. Nov. 5, 1930. 376,598.

MANUFACTURE OF CONDENSATION PRODUCTS CONTAINING NITROGEN. I. G. Farbenindustrie. Nov. 10, 1930. 376,603.

MANUFACTURE OF 3-METHOXY- *and* 3-ETHOXY-4-HYDROXY-BENZALDEHYDE. W. W. Groves (*I. G. Farbenindustrie*). Nov. 10, 1931. 376,610.

PROCESS AND APPARATUS FOR THE TREATMENT OF SODA-TREATED TARS AND OTHER SIMILAR RESIDUES OF THE PETROLEUM INDUSTRY WITH A VIEW TO THE CONVERSION THEREOF INTO LIGHT PRODUCTS. Compagnie Internationale pour la Fabrication des Essences et Petroles. Nov. 14, 1930. 376,611.

PROCESS AND APPARATUS FOR THE CONTINUOUS TREATMENT OF HEAVY OILS WITH A VIEW TO THEIR CONVERSION INTO LIGHT PRODUCTS. Compagnie Internationale pour la Fabrication des Essences et Petroles. Nov. 14, 1930. 376,613.

PROCESS OF EVAPORATING SEA WATER OR OTHER LIQUIDS FROM WHICH WATER OR OTHER LIQUID IS TO BE REMOVED. J. O. Nygaard. Nov. 26, 1931. 376,619.

CHEMICAL HEATING COMPOSITION AND RECEPTACLE FOR USE THEREWITH. S. L. Goldberg. Nov. 28, 1931. 376,622.

MANUFACTURE OF NITRATED CELLULOSE. Kodak, Ltd. Dec. 31, 1930. 376,046.

PROCESS FOR PRODUCING ALKALI METAL BISULPHITE OR ALKALI METAL SULPHITE SOLUTIONS FROM WASTE LIQUORS OBTAINED BY DIGESTING PULP WITH ALKALI-SULPHUR COMPOUNDS. Patentaktiebolaget Grondal-Ramen. Jan. 10, 1931. 376,654.

PROCESS FOR THE MANUFACTURE OF ALKALI DICHROMATES. Bozel-Maletra, Soc. Industrielle de Produits Chimiques. Mar. 21, 1931. 376,661.

MANUFACTURE OF 1-AMINO-2-ALKOXYNAPHTHALENES. Society of Chemical Industry in Basle. Feb. 9, 1931. 376,667.

MANUFACTURE AND PRODUCTION OF CALCIUM NITRATE FROM DOLOMITE WITH THE SIMULTANEOUS RECOVERY OF MAGNESIA. Klockner-Werke Akt.-Ges. and O. Kippe. Mar. 4, 1932. 376,683.

Complete Specifications open to Public Inspection

PRODUCTION OF PHOSPHATE COATINGS ON METALS. Metal Finishing Research Corporation. July 7, 1931. 30357/31.

MANUFACTURE OF ACID-WOOL DYESTUFFS OF THE ANTHRAQUINONE SERIES. W. W. Groves. July 9, 1931. 5531/32.

PROCESS FOR THE UTILISATION OF THE NITROGEN FROM NITROSYL CHLORIDE. Kali-Forschungs-Anstalt Ges. July 9, 1931. 6834/32.

PROCESS FOR THE MANUFACTURE OF METALLIC MAGNESIUM FROM MAGNESIUM OXIDE. Oesterreichisch-Amerikanische Magnesit Akt.-Ges. July 8, 1931. 11804/32.

PROCESS FOR THE PRODUCTION OF DYEBATHS AND PRINTING COLOURS FOR NAPHTHOL DYES. H. T. Bohme A.-G. July 9, 1931. 15739/32.

MANUFACTURE OF PHOSPHORUS. Victor Chemical Works. July 11, 1931. 17657/32.

MANUFACTURING OF NON-SPLINTERING CRYSTAL AND GLASS. I. S. Vidal. July 7, 1931. 18178/32.

PROCESS FOR THE MANUFACTURE OF DERIVATIVES OF CHELIDAMIC ACID. Schering-Kahlbaum Akt.-Ges. July 10, 1931. 18580/32.

RECTIFICATION OF ALCOHOL. Usines de Melle and H. M. Guinot. July 6, 1931. 19088/32.

PROCESS FOR THE MANUFACTURE OF AMMONIUM SALTS. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 8, 1931. 19390/32.

CENTRIFUGING PROCESS FOR SEPARATING THE MOTHER LIQUOR FROM CRYSTALS OR CRYSTALLINE SYRUP. Raffinerie Tirlemontoise Soc. Anon. July 9, 1931. 19597/32.

SENSITISING PHOTOGRAPHIC EMULSION. I. G. Farbenindustrie. July 11, 1931. 19598/32.

MANUFACTURE OF AZO-DYESTUFFS ON THE FIBRE. I. G. Farbenindustrie. July 9, 1931. 19599/32.

PROCESS FOR SENSITISING PHOTOGRAPHIC EMULSIONS. I. G. Farbenindustrie. July 11, 1931. 19603/32.

Applications for Patents

MANUFACTURE OF CARBOCYANINE DYES. Kodak, Ltd. June 30. (United States, June 30, '31.) 18533.

TREATMENT OF IRON PYRITES. S. I. Levy. June 30. 18495.

TREATMENT OF METAL SULPHIDES. S. I. Levy. June 30. 18496.

DISSOLVING SOLID, ETC., SUBSTANCES AND DELIVERY OF LIQUID SOLUTIONS. Liverpool Borax Co., Ltd. June 27. 18037.

MANUFACTURE OF ALKALI CARBONATE OF ALKALI HYDROXIDE AND AMMONIA. A. Mentzel. June 29. (Aug. 21, '31.) 18386.

PRODUCTION, ACTIVATION, ETC., OF METALLIC CATALYSTS. W. W. Myddyeton. June 27. 18086, 18087.

MANUFACTURE OF DERIVATIVES OF CHELIDAMIC ACID. Schering-Kahlbaum A.-G. June 30. (Germany, July 10, '31.) 18580.

MANUFACTURE OF CATALYSTS. Schering-Kahlbaum. July 1. (Germany, July 28, '31.) 18675.

PREPARATIONS FOR AGRICULTURAL PEST CONTROL, ETC. P. Spence and Sons, Ltd. July 1. 18589.

PRODUCTION OF REGENERATED CELLULOSE FROM CELLULOSE XANTHATES Waxed Papers, Ltd. June 29. 18417.

MANUFACTURE OF SUBSTITUTED AMMONIUM DITHIOCARBAMATES. W. Baird and Imperial Chemical Industries, Ltd. July 12. 19653.

PRODUCTION OF ALDEHYDES. H. T. Böhme A.-G. July 15. (March 17.) (Germany, July 15, '31.) 20044.

PRODUCTION OF CARBONYL COMPOUNDS. H. T. Böhme A.-G. July 15. (March 17. (Germany, Nov. 14, '31.) 20123.

CARBON DIOXIDE CONTAINERS. Carbon Dioxide Co., Ltd. July 12. 19731.

MANUFACTURE OF BENZANTHRONE ALDEHYDES. A. Carpmael (*I. G. Farbenindustrie*). July 16. 20211.

PRODUCTION OF WATER-SOLUBLE VITAMIN CONCENTRATES. S. J. Dennenberg. July 15. (United States, May 7.) 20126.

PRODUCTION OF ANHYDRIDES OF VOLATILE FATTY ACIDS. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. July 15. 20089.

MANUFACTURE OF DITHIOCARBAMIC ACIDS, ETC. Deutsche Hyrierwerke A.-G. July 14. (Germany, June 11.) 19977.

MANUFACTURE OF SULPHURIC ACID ESTERS FOR DYEING, ETC., TEXTILE FIBRES. Durand and Huguenin A.G. July 14. (Germany, July 15, '31.) 19958.

DERIVATIVES OF AZO-QUINOLINE. G. B. Ellis (*Boehringer and Soehne Ges.*) July 11. 19586.

INSECTICIDES, FUNGICIDES, ETC. Grasseli Chemical Co. July 15. (United States, July 18, '31.) 20063.

MANUFACTURE OF ORGANIC CONDENSATION PRODUCTS. E. L. Holmes. July 12. 19658.

PRODUCTION OF ALUMINA FROM CLAY, ETC. J. F. Hyslop and J. G. Stern and Co. July 11. 19521.

SENSITISING PHOTOGRAPHIC EMULSION. I. G. Farbenindustrie. July 11. (Germany, July 11, '31.) 19598, 19603.

MANUFACTURE OF AZO DYESTUFFS ON THE FIBRE. I. G. Farbenindustrie. July 11. (Germany, July 9, '31.) 19599.

PHOTOGRAPHIC EMULSIONS. I. G. Farbenindustrie. July 14. (Germany, July 24, '31.) 19959.

MANUFACTURE OF EMULSION OF WOOL FAT. I. G. Farbenindustrie. July 14. (Germany, July 14, '31.) 19960.

DYES. I. G. Farbenindustrie. July 16. (Germany, July 22, '31.) 20212.

PRODUCTION OF ORGANIC COMPOUNDS. P. C. C. Isherwood and W. J. Bush and Co., Ltd. July 13. 19815.

MANUFACTURE OF ALCOHOLS. J. Y. Johnson (*I. G. Farbenindustrie*).

From Week to Week

MR. J. D. BRUNT has been elected, for the third time, chairman of the Sugar Association of Lancashire, Ltd., of Liverpool.

AT A MEETING of the board of the Institute of Physics held on July 12, the following were elected to membership:—Fellows: E. W. Bliss, W. Gamble, and V. I. Vaidhianathan; Associates: F. Oldham, L. D. Mahajan, and D. Narayanamurti.

DAMAGE AMOUNTING TO £70,000 was caused by a fire in a warehouse on the water front at Auckland, New Zealand, when a large stock of kauri gum was destroyed. The gum was valued at £35,000 and is said to have been insured in London.

A NEW SOURCE OF HELIUM has been discovered on a cocoa estate at Port of Spain (Trinidad) The gas was struck at various depths under ninety feet whilst drilling for oil. A sample was sent to the United States for a test, and has been definitely identified as helium. Hitherto the only place in the British Empire where helium has been found is Canada.

RECENT WILLS include:—Mrs. Amy Willmer Woolley, of Broadway, Hale, Cheshire, manufacturing chemist, £41,091 (net personalty £35,397); Mr. Herbert Rigby, of Lytham, Lancs., drysalter and oil merchant, chairman of Rigby Taylor, oil refiners, and a director of Wigglesworth, manufacturing chemists, Westhoughton, £26,698 (net personalty £25,080).

MR. A. M. WILLIAMS, the National Conservative candidate in the North Cornwall by-election, has received a letter signed by forty-seven workers in the arsenic mines in the Gunnislake area asking whether he would give evidence in support of an application which is being made by the Cornish Chamber of Mines to the Tariff Advisory Board requesting that the duty on imported arsenic shall be increased from 10 per cent. to 33⅓ per cent.

UNEMPLOYMENT in the chemical and allied trades on June 27 was as follows:—Chemicals, wholly unemployed 14,788, temporary stoppages 1,439; explosives, wholly unemployed 1,562, temporary stoppages 363; paint, varnish, red and white lead, wholly unemployed 1,909, temporary stoppages 149; oil, glue, soap, ink and matches, wholly unemployed 8,009, temporary stoppages 2,423; coke ovens and by-product works, wholly unemployed 3,269, temporary stoppages 798.

MR. H. J. POOLEY, general secretary, sent the following telegram to the King from the Nottingham meeting of the Society of Chemical Industry on July 14: "The members of the Society of Chemical Industry assembled at Nottingham in general meeting, offer respectful and loyal greetings to their Royal patron and Sovereign." The message received in reply was as follows: "The King has received with much pleasure the message from the members of the Society of Chemical Industry, assembled in Nottingham and sincerely thanks them for their loyal greetings."

TWO NEW APPOINTMENTS have been made by the Council of Armstrong College, including that of Professor G. R. Clemo, professor of organic chemistry, to be director of the department of chemistry. This post was vacant by the retirement of Professor H. V. A. Briscoe, who is leaving Armstrong College at the end of this term to take up a position at Imperial College, London. The Council has also appointed Dr. H. L. Riley to be professor of inorganic physical chemistry; he is at present a lecturer at the Royal College of Science, London.

A REPRESENTATION has been made to the Board of Trade under Section 10 (5) of the Finance Act, 19926, for the exemption of amorphous carbon electrodes exceeding 12 in. square in cross section and over 3 ft. long with longitudinal slots exceeding 2 in. in width and 4 in. in depth, from the duty imposed by Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act, on the ground that they are not made in any part of the Dominions in substantial quantities having regard to the consumption for the time being in the United Kingdom, and that there is no reasonable probability that they will within a reasonable period be made in the dominions in such substantial quantities. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than August 15.

MR. SIDNEY B. WATKINS, Maesteg, Glam., has been awarded the M.Sc. degree of the University of Wales in recognition of research work carried out on the chemical constitution and properties of low-grade coals.

A SLIGHT DROP in the value of chemical products imported into the Irish Free State is revealed by the statistics for May, 1932, when imports were valued at £95,639, as against £98,552 in the corresponding period of last year. Imports of fertilisers also declined, totalling £34,916 as compared with £36,260 in May, 1931.

ACCORDING TO AN INVESTIGATION made by the Cardiff College of the University of Wales, the National Oil Refineries of the Anglo-Persian Oil Co., Ltd., at Llandovery, near Swansea, is to-day the most important single industrial unit in South Wales and Monmouthshire.

MAJOR RICHARD MILES, general manager of the Thorncliffe Ironworks, Chapeltown, Sheffield, of Newton, Chambers and Co., has resigned his position with the firm in order to take up the position of director and general manager of Head, Wrightson and Co., Ltd., of Stockton-on-Tees. He succeeds Mr. Malcolm Blair, who has been general manager of the company for the past 21 years. Mr. Blair will retain a position as part-time acting director of Head, Wrightson, and Co., Ltd.

THE I. G. FARBENINDUSTRIE in its report for the second quarter of 1932 states that the difficulties from which the commerce of the world is suffering make themselves felt with particular severity in the sale of all chemical products. Turnover in dyestuffs, dye ingredients, chemicals, pharmaceutical products, photographic material, rayon and fertilisers have all undergone drastic reductions. The outlook for the second half of 1932 justifies the gloomy predictions made in the company's reports for the year 1931 and the first quarter of 1932. The chief obstacles to a trade revival are the economic and financial prohibitions raised by very many countries.

IN THE CHANCERY DIVISION on July 14, Mr. Justice Bennett had before him an action by Continental Tintex and Dye Products, Ltd., claiming two sums of £7,000 odd each as damages against Mr. Vernon Dunhill and Mr. Ernest John Allisstone, formerly directors of the plaintiff company, and British and American Joint Stock Trust, Ltd., in respect of the allotment of 38,900 shares of 5s. each in the plaintiff company. The allegation was that the 38,900 shares were allotted to a Mr. Anderson, a clerk with the defendant company, who was known by the defendant directors to be not in a position to take up or pay for the shares. In their defence, the defendants denied all the plaintiffs' allegations, and the hearing was adjourned. The case was concluded on July 20, when Mr. Simonds (for the plaintiff company) said that the two individual defendants consented to judgment in a capital sum and interest and would pay plaintiffs' costs of the action.

DAMAGES AMOUNTING TO £7,000 were awarded by a special jury, sitting with Mr. Justice Horridge in the King's Bench on July 14, to Mr. William Ross, of Cardigan Road, Bridlington, who sued Richard Hodgson and Sons, of Weston Street, London, for wrongful dismissal. The plaintiff was formerly works manager at the defendants' glue and gelatine department at Beverley under a five-year agreement dated October, 1928, at £1,250 a year and commission. His case was that in May, 1931, he was dismissed after he had asked a director to inquire what terms the board would offer to release him from the agreement. The defendants maintained that Mr. Ross asked to be released, and that they accepted his resignation. They also alleged that they were justified in dismissing Mr. Ross because of his misconduct in making statements about directors and inviting other employees to leave the company with him. Mr. Ross denied this allegation. Judgment was entered for Mr. Ross with costs, but a stay of execution, pending notice of appeal, was granted.

Forthcoming Events

July 26.—Colour Users' Association. Annual general meeting, 12 noon. Cromwell Buildings, Blackfriars Street, Manchester.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

CHEMICAL NEWS, LTD., London, E.C. (M. 23/7/32.) Registered July 11, £150 debenture to H. W. B. Ryan, Merton-ho, Salisbury Square, E.C.; general charge. *Nil. April 30, 1931.

LAUTARO NITRATE CO., LTD., London, E.C. (M. 23/7/32.) Registered April 28, mortgage for 2,000,000 Chilean pesos, &c., to Workmen's Accident Department of National Savings Institution of the Republic of Chile; charged on property at Port of Antofagasta. *£8,293,073. January 12, 1932.

SCOTTISH GAS UTILITIES CORPORATION, LTD., London, S.W. (M. 23/7/32.) Registered June 24, Trust Deed dated June 16, 1932, securing £50,000 and any further stock issued not exceeding, in all £100,000, with 5 per cent. premium; charged on land and buildings at Glenboig, N.B. & Co.'s other real property and a floating charge on the undertaking, property and assets (except in Scotland) other than uncalled capital.

London Gazette, &c.

Companies Winding Up Voluntarily

SOCOMAC OILS, LTD. (C.W.U.V. 23/7/32.) By special resolution, July 11. Mr. D. G. Adamson, 242 Ellesmere Road, Newcastle-upon-Tyne, appointed liquidator.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to August 13, 1932.

Vulcaprene. 532,460. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. British Dyestuffs Corporation, Ltd., Blackley, Manchester.

Muramel. 532,571. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Soliguum, Ltd., 12 Norfolk Street, London, W.C.2.

Desox. 532,639. Class 1. A chemical compound used as an agent for preventing india-rubber latex from deteriorating. I. G. Farbenindustrie.

Shelphalt. 531,874. Class 4. Raw, or partly prepared, vegetable, animal and mineral substances used in manufactures. Shell-Mex and B.P., Ltd., Great St. Helens, London, E.C.3.

Vulcaprene. 532,461. Class 4. Raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures. British Dyestuffs Corporation, Ltd., Blackley, Manchester.

Plurafil. 532,663. Class 4. Raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures. I. G. Farbenindustrie.

New Companies Registered

Alba Chemical Co., Ltd., Bowlee Mill, Bowlee, near Middleton. Registered July 16. Nominal capital £2,000 in £1 shares. To acquire the business of chemical manufacturers carried on at Bowlee Mill, as the Alba Chemical Co., and to adopt an agreement with S. Eastwood. Directors: S. Eastwood, "Baildon," Broadway, Cheadle, Cheshire, and C. G. Eastwood.

Kempac, Ltd. Registered July 18. Nominal capital £100 in £1 shares. To carry on the business of manufacturing chemists at Batley, Yorks.; to acquire the registered trade mark "Kempac," and to adopt an agreement with Emma M. Coates. Subscribers: Elizabeth Walton, Hill House, 3 Park Road, Dewsbury, and G. A. Halstead.

C. & U., Ltd., 6 Conduit Street, W.1. Registered July 14. Nominal capital £100 in £1 shares. To acquire an option to purchase the patent rights in respect of Hong Kong, the Straits Settlements and the Federated Malay States in an invention relating to a process for the manufacture and production of solid carbon dioxide, to adopt an agreement with G. D. G. Cribb, to exercise the option, to sell and transfer the company's rights and obligations under the agreements, etc. Permanent directors: W. Y. Cooke, 39 Hamptoup Road, Teddington, E. A. Udy, and E. F. Double.

Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British West Indies.—A manufacturers' agent at Nassau desires to obtain the representation on a commission basis, for the Bahamas, of United Kingdom manufacturers of soda crystals and caustic soda. (Ref. No. 74.)

Germany.—A firm established at Berlin wishes to obtain the representation of United Kingdom exporters of copper (copper cathodes), zinc and zinc sheets, aluminium sheets, non-corrosive aluminium and antimony. (Ref. No. 84.)

Egypt.—The Egyptian Ministry of the Interior is calling for tenders, to be presented in Cairo by September 24, 1932, for the supply of electrically operated ice-making plants at the following towns: Minieh, Zagazig, Fayoum, Keneh, Assouan. (Ref. A.X. 11414.)

Brazil.—A firm in Porto Alegre desires to receive quotations for the supply of foundry coke from the United Kingdom in quantities of from 30 to 50 tons a month. (Ref. B.X. 7371.)

Company News

John Knight.—Dividend on 25 per cent. Preferred Ordinary shares at rate of 12½ per cent. for half-year.

Vitamins.—Profit for year ended March 31, 1932, after making full provision for depreciation and income-tax, was £7,511, less loss brought forward £3,860, leaving balance of profit of £3,651. This will enable interest to be paid for period from April 1, 1929, to March 31, 1930, absorbing, after deduction of tax, £3,375.

British Bitumen Emulsions.—Net profit for 1931 was £7,277, add £358 brought forward, making £7,635. Of this, £2,500 has been reserved for income tax, while preliminary expenses and expenses in connection with increase of share capital totalling £2,053 have been written off, leaving £3,081, which is carried forward.

Harben's (Viscose Silk Manufacturers).—Accounts for year to April 30, 1932, show profit of £40,096 (against £33,393), to which must be added £31,839 brought forward, giving £71,935. No dividends recommended. (Fixed dividend on both classes of Preference shares paid to April 30, 1930.)

Courtaulds, Ltd.—Interim dividend of 1½ per cent. on the £24,000,000 ordinary share capital of the company, free of income-tax. Payment will be made on August 13, to shareholders registered on July 14. This dividend compares with 2 per cent., tax free, paid in respect of the first six months of 1931. For the whole of last year, 5 per cent., tax free, was distributed, against 6 per cent. in 1930 and 10 per cent. in 1929.

Dubilier Condenser Company (1925).—Operations for year ended March 31, 1932, resulted in loss of £12,193, compared with £20,918 in preceding year; in addition works have been reorganised to take care of new products at cost of £1,591, and reserves have been set up for depreciation of stocks, losses of subsidiary companies, for re-distribution and disposal of unwanted plant and for bad debts £23,409, making debit balance for year of £37,193 as compared with £45,790.

Consolidated Tin Smelters.—Accounts for year ended June 30, 1932, which include for first time results of each of subsidiary companies for a period of twelve months, show profit for year, including bonus dividend of £50,000 received from subsidiary company, of £253,836, to which is added amount brought forward £81,513, making £535,349, out of which £65,020 has been applied in payment of 7 per cent. non-cumulative preference dividend. Dividend of 5 per cent. recommended on ordinary shares, less tax, requiring £74,943, leaving £95,386 to be carried forward.

United Water Softeners.—Report for 1931 states that results obtained do not permit of payment of dividend on ordinary capital. This is the first occasion since amalgamation in 1922 that ordinary shareholders will have received no annual return on their capital. Orders booked during 1931 slightly exceeded those of previous year, but certain large contracts were obtained too late in year for full benefit to be given effect to in year's accounts. As a result, uncompleted orders carried forward into 1932 greatly exceeded amount brought into accounts for 1931. Profit for year, before tax, depreciation and directors' fees was £4,254.

Lovering China Clays.—Profit for year to March 31, 1932, before charging debenture interest and allocation to sinking fund for redemption of debentures, amounts to £7,149 as against £6,844. After charging debenture interest of £14,838 net loss was £7,688 to which is added amount allocated to sinking fund for redemption of debentures £2,662 and amount allocated to works insurance reserves £899, making total loss for year £11,249; adding balance brought forward £7,719 there is debit balance on profit and loss account of £18,088. Debenture holders have agreed, under certain conditions, to postponement of payment of debenture interest, and redemption of debentures as provided for in trust deed.